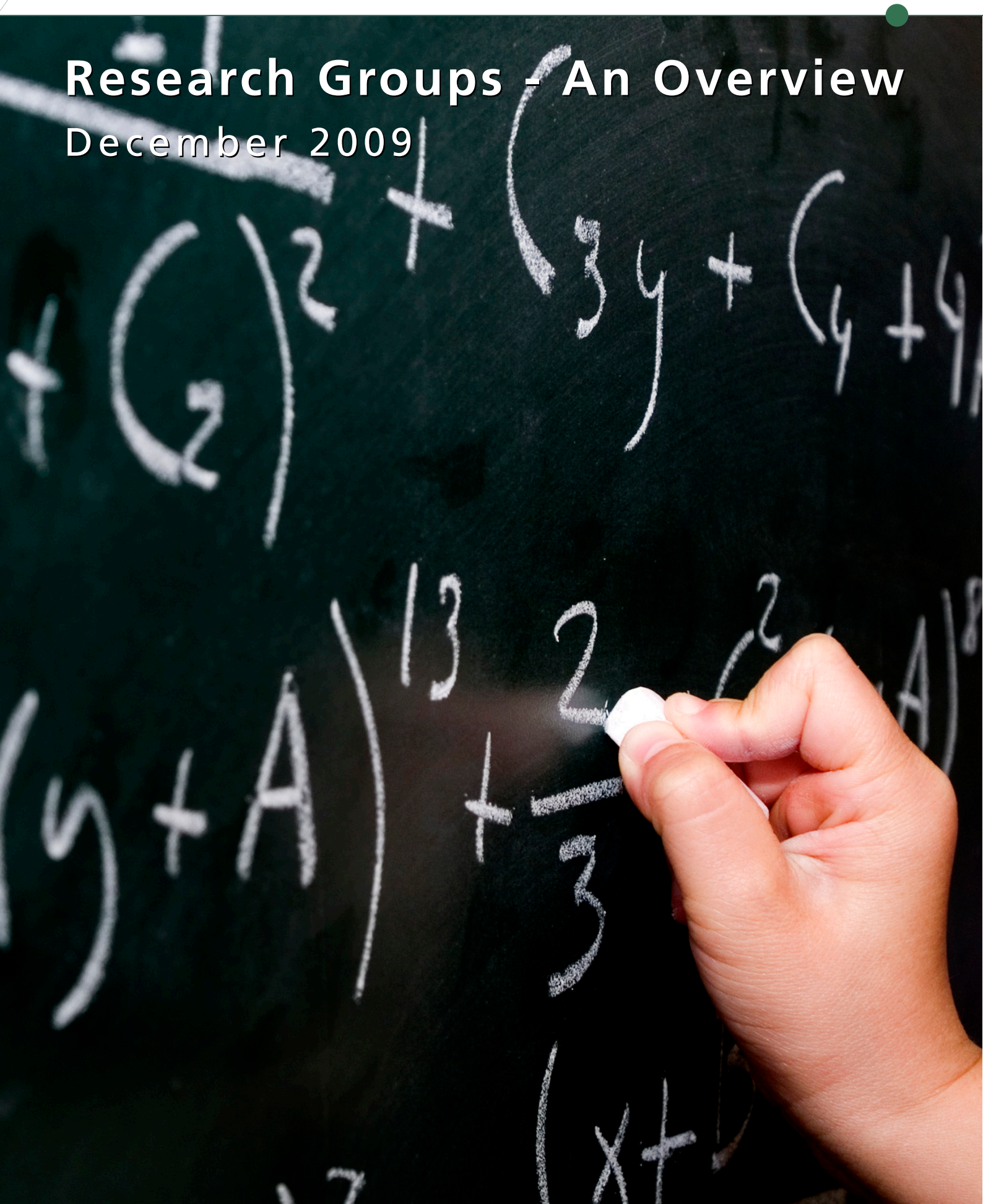
FACULTY OF SCIENCE
UNIVERSITY OF COPENHAGEN

Research Groups - An Overview

December 2009



Caption (front page)

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Departments at the Faculty of Science

Department of Biology
www.bio.ku.dk

Department of Chemistry
www.ki.ku.dk

Department of Computer Science
www.diku.dk

Department of Exercise and Sport Sciences
www.ifi.ku.dk

Department of Geography and Geology
www.geo.ku.dk

Department of Mathematical Sciences
www.math.ku.dk

Department of Science Education
www.ind.ku.dk

Natural History Museum of Denmark
www.snm.ku.dk

Niels Bohr Institute
www.nbi.ku.dk

Interdisciplinary Research Centers

Earth System Science Center
Leader: Prof. Morten Pejrup. Department of Geography and Geology
Contact: mp@geo.ku.dk

eScience Center
Leader: Prof. Brian Vinter, Department of Computer Science
Contact: vinter@diku.dk

Nano-Science Center
Leader: Prof. Thomas Bjørnholm, Department of Chemistry
Contact: tb@nano.ku.dk

Polar Science Center
Leader: Prof. Kirsten S. Christoffersen, Department of Biology
Contact: kchristoffersen@bio.ku.dk

Space Science Center
Leader: Associate Prof. Kristian Pedersen, Niels Bohr Institute
Contact: kp@dark-cosmology.dk

Centers funded by the Danish National Research Foundation

Hosted by the Faculty of Science:

Danish-Chinese Center for Molecular Nanoelectronics
Leader: Prof. Thomas Bjørnholm, Nano-Science Center & Department of Chemistry
Contact: tb@nano.ku.dk

Center for Stars and Planets
Leader: Prof. Martin Bizzarro, Natural History Museum of Denmark
Contact: Bizzarro@snm.ku.dk

Center for GeoGenetics
Leader: Prof. Eske Willerslev, Natural History Museum of Denmark
Contact: ewillerslev@snm.ku.dk

Center for Symmetry and Deformation
Leader: Prof. Jesper Grodal, Department of Mathematical Sciences
Contact: jg@math.ku.dk

Center of Excellence in Particle Physics Phenomenology (DISCOVERY)
Leader: Associate Prof. Peter Hansen, Niels Bohr Institute
Contact: phansen@nbi.dk

Center for Macroecology, Evolution, and Climate (CME)
Leader: Prof. Carsten Rahbek. Department of Biology
Contact: crahbek@bio.ku.dk

Center for Ice and Climate
Leader: Prof. Dorthe Dahl-Jensen, Niels Bohr Institute
Contact: ddj@gfy.ku.dk

Center for Comparative Genomics
Leader: Prof. Roger Garrett, Department of Biology
Contact: garrett@bio.ku.dk

Center for Dark Cosmology (DARK)
Leader: Prof. Jens Hjorth, Niels Bohr Institute
Contact: jens@dark-cosmology.dk

Center for Social Evolution
Leader: Prof. Jacobus J. Boomsma, Department of Biology
Contact: jjboomsma@bio.ku.dk

Center for Molecular Movies
Leader: Prof. Martin Meedom Nielsen, Niels Bohr Institute
Contact: martin.m.nielsen@nbi.dk

Center for Models of Life (C-Mol)
Leader: Prof. Kim Sneppen, Department: Niels Bohr Institute
Contact: sneppen@nbi.dk

Center for Quantum Optics (Quantop)
Leader: Prof. Eugene S. Polzik, Niels Bohr Institute
Contact: polzik@nbi.dk

Hosted by other Faculties/Universities, with the participation of SCIENCE researchers

Nordic Center for Earth Evolution (University of Southern Denmark)
Faculty of Science Leader: Prof. Minik Rosing, Natural History Museum of Denmark
Contact: minik@snm.ku.dk

Center of Inflammation and Metabolism (Copenhagen University Hospital)
Faculty of Science Leader: Associate prof. Henriette Pilegaard, Department of Biology
Contact: hpilegaard@bio.ku.dk

1. DEPARTMENT OF BIOLOGY

Section 1: **Functional Genomics**
Groups: Archaea Center
Plant Molecular Biology
Cell Cycle and Genome Stability
Section 2: **Section for Biomolecular Sciences**
Groups: Microbial Metabolism and Enzymology
Structural Biology and NMR Laboratory (SBiNLab)
MolPhysX at BIO
Protein Biology
Section 3: **Section for Bioinformatics**
Groups: RNA Biology
Structural Bioinformatics
Genomics and RNA
Sandelin
Evolutionary Genetics
Molecular Evolution
Section 4: **Section for Cell and Developmental Biology**
Groups: Cancer Cell Signaling
Cilia group
Cell Physiology and Biology
Genomics and Molecular Biomedicine
Immunology (Inflammation and Cancer Group)
Section 5: **Molecular Integrative Physiology**
Section 6: **Cell and Neurobiology/Center for Functional and Comparative Insect Genomics**
Section 7: **Microbiology Section**
Section 8: **Section of Terrestrial Ecology**
Groups: Soil Biology
Physiological Ecology
Mycology
Section 9: **Section for Ecology and Evolution**
Groups: Centre for Social Evolution
Animal Behaviour
Population Ecology
Biodiversity and Macroecology
Section 10: **Freshwater Biology Section (FBS)**
Section 11: **Marine Biology**
Section 12: **Evolution and Ecology of Aquatic Organisms**
Groups: Plankton evolution and ecology
Comparative Zoology

Section:	Functional Genomics
Department:	Biology
Group Leader:	Michael Lisby, Assocociate Professor, 35 32 21 20, mlisby@bio.ku.dk

1. Description of Research Field

We use genomic and molecular genetic approaches to study basic aspects of cellular function in model organisms of known genome sequence, in plants (Arabidopsis), animals (mice), lower eukaryotes (yeasts), archaea (Sulfolobus, Haloferax) and bacteria (Wolbachia). Specifically, we study growth control and differentiation, DNA replication and repair, chromatin structure and transcriptional regulation, antibiotic inhibition of protein biosynthesis, signal transduction in host/microbe interaction and virus-host interactions in archaea, RNA localization and the function of small RNA molecules in regulation, development and evolution, as well as whole genome evolution.

2. Five newer representative publications

- Khadaroo, B., Teixeira, M.T., Luciano, P., Eckert-Boulet, N., Germann, S.M., Simon, M.N., Gallina, I., Abdallah, P., Gilson, E., Géli, V., and Lisby, M. (2009) The DNA damage response at eroded telomeres and tethering to the nuclear pore complex. Nat. Cell Biol., 11(8): 980-7.
- Hofius D,Schultz-Larsen T, Joensen J, Tsitsigiannis DI, Petersen NHT, Mattsson O, Jørgensen LB, Jones JDG, Mundy J, Petersen M (2009) Autophagic Components Contribute to Hypersensitive Cell Death in Arabidopsis. Cell 137, 773
- Peng, N., Xia, Q., Chen, Z., Liang, Y.X., and She, Q.. An upstream activation element exerting differential transcriptional activation on an archaeal promoter. Molec. Microbiol., 74, 928-939, 2009.
- Lillestøl, R.K., Shah, S.A., Brügger, K., Redder, P., Phan, H., Christiansen, J. and Garrett, R.A. CRISPR families of the crenarchaeal genius *Sulfolobus*: bidirectional transcription and dynamic properties. Molec. Microbiol. 72, 259-272, 2009.
- Kjærulff, S., Andersen, N.R., Borup, N.T. and Nielsen, O. Cdk-phosphorylation of the Ste11 transcription factor constrains differentiation specific transcription o G1. Genes & Dev. 21:347-359 (2007).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	7	0	7
Assist. Professor	0	0	0
Post-doc	2	13	15

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	14	3	17
Ph.D.	12	8	20

5. Three important external sources of income/grants (Funding bodies)

Novo Nordisk Foundation
Danish Natural Science Research Council
European Research Council

6. Three important collaborative research contracts/grants (Inter- & national)

European Union Framework Programmes
University of CPH Center of Excellence MolPhysX
Danish National Research Foundation Center C-Mol

Group:	Archaea
Department:	Biology
Group Leader:	Roger Garrett, Professor, 35 32 20 10, garrett@bio.ku.dk

1. Description of Research Field

The archaea, the third domain of life on Earth, constitute about 25% of the planet's biomass and make major contributions to both biosphere and atmosphere. Many archaeal organisms thrive under extreme conditions of high temperatures, high salt concentrations, high pressures and strictly anaerobic conditions, but they also occur in all non extreme environments. We have developed comparative genomic, bioinformatic, biochemical and genetic approaches to study basic aspects of cellular function in model archaeal organisms, including the acido-hyperthermophile Sulfolobus and the extreme halophile Haloferax. Many of these basic processes are related to those found in eukaryotes and archaea often provide a simpler molecular system for investigating details of complex eukaryotic systems. Specifically, we study DNA replication and repair, RNA function and genome evolution. Moreover, we have discovered many novel archaea-specific viruses, which appear to be unrelated to both bacterial and eukaryotic viruses, and we are characterizing their exceptional biology and virus-host interactions.

2. Five newer representative publications

- Peng, N., Xia, Q., Chen, Z., Liang, Y.X., and She, Q.. An upstream activation element exerting differential transcriptional activation on an archaeal promoter. Molec. Microbiol., 74, 928-939, 2009
- Lillestøl, R.K., Shah, S.A., Brügger, K., Redder, P., Phan, H., Christiansen, J. and Garrett, R.A. CRISPR families of the crenarchaeal genius *Sulfolobus*: bidirectional transcription and dynamic properties. Molec. Microbiol. 72, 259-272, 2009.
- Basta T, Smyth J, Forterre P, Prangishvili D, and Peng X. Novel archaeal plasmid pAH1 and its interactions with the lipothrixvirus AFV1. Molec. Microbiol. 71, 23-34, 2009
- Brügger, K., Chen, L., Stark, M., Zibat, A, Redder, P., Ruepp, A., Awayez, M, She, Q., Garrett, R.A. & Klenk, H-P. The genome of Hyperthermus butylicus: a sulphur-reducing, peptide fermenting, neutrophilic Crenarchaeote growing up to 108^{o}C. Archaea, 2, 127-135, 2007.
- Prangishvili, D. Forterre, P. & Garrett, R. A. Viruses of the Archaea: a unifying view. Nature Rev. Microbiology, 4, 837-848, 2007.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	4	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	3	0	3
Ph.D.	3	0	3

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation Centre, Danish Natural Science Research Council, EU Framework

6. Three important collaborative research contracts/grants (Inter- & national)

European Commission Framework Programmes
EU Marie Curie Networks
Danish National Research Foundation

Group:	Plant Molecular Biology
Department:	Biology
Group Leader:	John Mundy, Professor, 28 75 42 78, MUNDY@science.ku.dk

1. Description of Research Field

Plants rely on an innate immune system that includes basal defence and surveillance receptor-mediated responses to defend themselves against invading pathogens. Our group aims to identify genes targeted by MAP kinase cascades below surveillance receptors, and identification of signaling determinants and effector targets involved in the regulation of innate immune responses. In addition, we focus on the identification and characterization of pathways and genes regulating the execution of pathogen-induced cell death responses.

2. Five newer representative publications

- Fiil BK, Petersen K, Petersen M, Mundy J (2009) Gene regulation by MAP kinase cascades. Curr Op Plant Biol. 12, 615
- Hofius D., Mundy J. and Petersen M. (2009). Self-consuming innate immunity. Autophagy 8:1206
- Hofius D,Schultz-Larsen T, Joensen J, Tsitsigiannis DI, Petersen NHT, Mattsson O, Jørgensen LB, Jones JDG, Mundy J, Petersen M (2009) Autophagic Components Contribute to Hypersensitive Cell Death in Arabidopsis. Cell 137, 773
- Qiu JL., Fiil BK., Petersen K., Nielsen HB., Botanga CJ., Thorgrimsen S., Palma K., Suarez-Rodriguez MC., Sandbech-Clausen S., Lichota J., Brodersen P., Grasser KD., Mattsson O., Glazebrook J., Mundy J., Petersen M. (2008). Arabidopsis MAP kinase 4 regulates gene expression through transcription factor release in the nucleus. EMBO J. 16:2214
- Qiu JL, Zhou L, Yun BW, Nielsen HB, Fiil BK, Petersen K, Mackinlay J, Loake GJ, Mundy J, Morris PC. (2008).Arabidopsis mitogen-activated protein kinase kinases MKK1 and MKK2 have overlapping functions in defense signaling mediated by MEKK1, MPK4, and MKS1. Plant Physiol. 1, 212

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	1	4	5

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	3	0	3
Ph.D.	3	0	3

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council, ERA-PG

6. Three important collaborative research contracts/grants (Inter- & national)

European Union Framework Programmes
EU Marie Curie Networks
Danish National Research Foundation

Group:	Cell Cycle and Genome Stability
Department:	Biology
Group Leader:	Olaf Nielsen, Professor, 35 32 21 02, onigen@bio.ku.dk

1. Description of Research Field

Cell cycle and Genome Stability (CH, ON): We are interested in the regulatory consequences of commitment to DNA replication in the mitotic cell cycle: how do mechanisms ensuring genome stability become activated at this point, and also how do alternative developmental pathways become blocked?

Chromatin dynamics (GT): Our research bears on heterochromatin in fission yeast. We investigate the recruitment of histone-modifying enzymes by either DNA-binding proteins or the RNA-interference pathway; the mechanisms permitting the epigenetic inheritance of heterochromatin in mitosis and meiosis; and the inhibition of transcription and recombination in heterochromatin.

Transcription, chromatin and DNA repair (ML, SH): Our research is centered around transcription, chromatin and DNA repair. Our goal is to understand the molecular mechanisms that allow transcription to be regulated in response to environmental and developmental cues and secures the maintenance of genome integrity, when the cell is faced with genotoxic stress.

2. Five newer representative publications

- Khadaroo, B., Teixeira, M.T., Luciano, P., Eckert-Boulet, N., Germann, S.M., Simon, M.N., Gallina, I., Abdallah, P., Gilson, E., Géli, V., and Lisby, M. The DNA damage response at eroded telomeres and tethering to the nuclear pore complex. Nat. Cell Biol., 11(8): 980-7 (2009).
- Dodd IB, Micheelsen MA, Sneppen K, Thon G. Theoretical analysis of epigenetic cell memory by nucleosome modification. Cell 129, 813-822 (2007).
- Kjærulff, S., Andersen, N.R., Borup, N.T. and Nielsen, O. Cdk-phosphorylation of the Ste11 transcription factor constrains differentiation specific transcription o G1. Genes & Dev. 21:347-359 (2007).
- Torres-Rosell J, Sunjevaric I, De Piccoli G, Sacher M, Eckert-Boulet N, Reid R, Jentsch S, Rothstein R, Aragón L, Lisby M. The Smc5-Smc6 complex and SUMO modification of Rad52 regulates recombinational repair at the ribosomal gene locus. Nat Cell Biol., 9, :923-31 (2007).
- Zhu X, Wirén M, Sinha I, Rasmussen NN, Linder T, Holmberg S, Ekwall K, Gustafsson CM. Genome-wide occupancy profile of mediator and the Srb8-11 module reveals interactions with coding regions. Mol Cell. 22, 169-178 (2006).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	1	5	6

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	8	3	11
Ph.D.	6	8	14

5. Three important external sources of income/grants (Funding bodies)

Novo Nordisk Foundation, Danish Natural Science Research Council, European Research Council

6. Three important collaborative research contracts/grants (Inter- & national)

Lundbeck Foundation
University of CPH Center of Excellence MolPhysX
Danish National Research Foundation Center C-Mol

Group:	Section for Biomolecular Sciences
Department:	Biology
Group Leader:	Jakob R. Winther, Professor, 35 32 15 00, jrwinther@bio.ku.dk

1. Description of Research Field

In the Section for Biomolecular Sciences we investigate protein metabolism in its broadest sense. The areas of interest reach from protein synthesis and turnover over protein dynamics and design to enzymology and metabolic networks. The section is firmly based in the molecular biology and biophysics. The section is comprised of 4 subgroups: *Protein Biology*, *Structural and NMR laboratory*, *MolPhysX at BIO*, and *Microbial Metabolism and Enzymology.*

2. Five newer representative publications

- Ejby M, Sørensen MA, Pedersen S (2007) Pseudouridylation of helix 69 of 23S rRNA is necessary for an effective translation termination. Proc. Natl. Acad. Sci. USA; **104**:19410-5.
- Kriegenburg F, Seeger M, Saeki Y, Tanaka K, Lauridsen AM, Hartmann-Petersen R, Hendil KB. (2008). In vivo reduction-oxidation state of protein disulfide isomerase: The two active sites independently occur in the reduced and oxidized forms. *Cell*, 135, 355-65.
- Appenzeller-Herzog, C., Riemer, J., Christensen, B., Sørensen, E. S. and Ellgaard, L. (2008) A novel disulfide switch mechanism in Ero1α balances ER oxidation in human cells. *EMBO J.*, 27, 2977-87
- Christoffersen S, Kadziola A, Johansson E, Rasmussen M, Willemoës M, Jensen KF (2009). Structural and kinetic studies of the allosteric transition in *Sulfolobus solfataricus* uracil phosphoribosyltransferase: Permanent activation by engineering of the C-terminus. J Mol Biol 393, 464-477.
- Teilum, K., Smith, M. H., Schulz, E., Christensen, L. C., Solomentsev, G., Oliveberg, M. & Akke, M. (2009) Transient structural distortion of metal-free Cu/Zn superoxide dismutase triggers aberrant oligomerization. *Proc. Natl. Acad. Sci. USA* **106**, 18273-18278

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	11	2	13
Assist. Professor	1	0	1
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	21	18	39
Ph.D.	13	7	20

5. Three important external sources of income/grants (Funding bodies)

See individual subgroups

6. Three important collaborative research contracts/grants (Inter- & national)

See individual subgroups

Group:	Microbial Metabolism and Enzymology
Department:	Biology
Group Leader:	Kaj Frank Jensen, Professor, 35 32 20 20, kfj@bio.ku.dk

1. Description of Research Field

We are clarifying hitherto unknown pathways of metabolism of nucleotides, sulfur, phosphor and phosphonates in microorganisms and study structure, function and catalytic mechanisms of the involved enzymes, transport systems and regulatory proteins. Furthermore, we have recently initiated a project in engineering metabolic pathways in cyanobacteria and a protein design project aimed to construct an artificial enzyme that "mimics" and is able to replace the function of an essential enzyme of metabolism.

2. Five newer representative publications

- Hove-Jensen B, Rosenkrantz TJ, Zechel DL, Willemoës M (2010) Accumulation of intermediates of the carbon-phosphorous lyase pathway for phosphonate degradation in *phn* mutants of *Escherichia coli*. J Bacteriol (Epub ahead of print, Oct. 23, 2009. Doi: 10.1128/JB.01131-09)
- Gregersen LH, Habicht KS, Peduzzi S, Tonolla M, Canfield DE, Miller M, Cox RP, Frigaard NU (2009) Dominance of a clonal green sulfur bacterial population in a stratified lake. FEMS Microbiol Ecol 70, 30-41.
- Christoffersen S, Kadziola A, Johansson E, Rasmussen M, Willemoës M, Jensen KF (2009). Structural and kinetic studies of the allosteric transition in *Sulfolobus solfataricus* uracil phosphoribosyltransferase: Permanent activation by engineering of the C-terminus. J Mol Biol 393, 464-477.
- Frigaard NU, Dahl C (2009) Sulfur metabolism in phototrophic sulfur bacteria. Adv Microb Physiol 54, 103-200.
- Jensen KF, Dandanell G, Hove-Jensen B, Willemoës M (2008). Nucleotides, nucleosides and nucleobases. *In* EcoSal "*Escherichia coli and Salmonella*: Cellular and molecular biology". (Eds. A Böck, R Curtis III, JB Kaper, PD Karp, FC Neidhard, T Nyström, JM Slauch, CL Squires) Module 3.6.2. ASM International. Doi: 10.1128/ecosal3.6.2.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2.5	1.5	4
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7	9	16
Ph.D.	1	0	1

5. Three important external sources of income/grants (Funding bodies)

Danish Research Council for Technology and Production Sciences
Danish Natural Science Research Council
The Danish National Advanced Technology Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

A. Kadziola, S. Larsen and P. Harris, Departments of Chemistry, University of Copenhagen and the Technical University of Denmark
D.L. Zechel, Department of Chemistry, Queen's University, Kingston, Ontario, Canada
D.A. Bryant, Department of Biochemistry and Molecular Biology, Pennsylvania State University, USA

Group:	Structural Biology and NMR Laboratory (SBiNLab)
Department:	Biology
Group Leader:	Flemming M. Poulsen, Professor, 35 32 20 77, fmp@bio.ku.dk

1. Description of Research Field

The research field of SBiNLab is the study of protein structure and function of proteins using NMR spectroscopy. We study proteins in all of their biologically active states i.e. the unfolded forms, the intrinsically unfolded forms, the native states and in the states of interactions between proteins and their binding partners. We use NMR and supplementary methods to study both the biophysical and the biological properties of proteins.

2. Five newer representative publications

- Soroka V, Kasper C, Poulsen FM. Structural Biology of NCAM, Neurochem Res. 2008
- Teilum K, Smith MH, Schulz E, Christensen LC, Solomentsev G, Oliveberg M, Akke M. Transient structural distortion of metal-free Cu/Zn superoxide dismutase triggers aberrant oligomerization
- Proc Natl Acad Sci U S A. 2009 Oct 27;106(43):18273-8
  Teilum K, Olsen JG, Kragelund BB. Functional aspects of protein flexibility. Cell Mol Life Sci. 2009;66(14):2231-47
- Olsen JG, Dagil R, Niclasen LM, Sørensen OE, Kragelund BB. Structure of the mature Streptococcal cysteine protease exotoxin mSpeB in its active dimeric form. J Mol Biol. 2009 Oct 30;393(3):693-703
- Danielsson J, Liljedahl L, Bárány-Wallje E, Sønderby P, Kristensen LH, Martinez-Yamout MA, Dyson HJ, Wright PE, Poulsen FM, Mäler L, Gräslund A, Kragelund BB. The intrinsically disordered RNR inhibitor Sml1 is a dynamic dimer. Biochemistry. 2008 Dec 16; 47(50):13428-37.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	0	2
Assist. Professor	0	1	1
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7	4	11
Ph.D.	5.5	2	7.5

5. Three important external sources of income/grants (Funding bodies)

Novo Nordisk Foundation, Carlsberg Foundation, Danish Research Councils

6. Three important collaborative research contracts/grants (Inter- & national)

MIRESOWA (Danish strategic research council, PI Jens Aamand, GEUS)
Novo Nordisk Foundation (Stine Falsig Pedersen, BIO)

Group:	MolPhysX at BIO
Department:	Biology
Group Leader:	Michael A. Sørensen, Associate Professor, 35 32 37 11, mas@bio.ku.dk

1. Description of Research Field

We constitute the experimental biology part of an interdisciplinary effort to address fundamental regulatory and mechanistic aspects of gene expression. Specific projects include: a) intramolecular determinants of functional mRNA half-life. b) determination of codon specific translation rates c) analysis of the lysis/lysogeny switch in bacteriophages and TP-901 d) coupling between pseudoknot strengths and programmed frameswitching e) effects of different regulatory mechanisms on the dynamics of gene networks.

2. Five newer representative publications

- Mitarai N, Sneppen K, Pedersen S (2008) Ribosome collisions and translation efficiency: optimization by codon usage and mRNA destabilization. J Mol Biol; **382**:236-45.
- Ejby M, Sørensen MA, Pedersen S (2007) Pseudouridylation of helix 69 of 23S rRNA is necessary for an effective translation termination. Proc. Natl. Acad. Sci. USA; **104**:19410-5.
- Hansen, T. M., Reihani, N., Oddershede L. B., and Sørensen, M. A. (2007). Correlation Between Mechanical Strength of Messenger RNA Pseudoknots and Ribosomal Frameshifting. Proc. Natl. Acad. Sci. USA; **104** : 5830-5835.
- Brown, S., Sand Jespersen, T. and Nygaard, J. (2008). A Genetic Analysis of Carbon Nanotube-Binding Proteins. Small; **4**:416-420.
- Svenningsen S.L., Tu K.C. and Bassler B.L. (2009). Gene dosage compensation calibrates four regulatory RNAs to control Vibrio cholerae quorum sensing. EMBO J. **28**(4): 429-39.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	2	1	3
Assist. Professor	0	1	1
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	1	3
Ph.D.	1	1	2

5. Three important external sources of income/grants (Funding bodies)

KU Excellence-Program MolPhysX
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

KU Excellence-Program MolPhysX
Center for Models of Life (Danish National Research Foundation)
Lundbeck Foundation

Group:	Protein Biology
Department:	Biology
Group Leader:	Jakob R. Winther, Professor, 35 32 15 00, jrwinther@bio.ku.dk

1. Description of Research Field

The Protein Biology Group is composed of five subgroups with extensive collaboration around protein structure-function analysis in relation to protein folding and quality control. Themes include:

- Proteasome-mediated protein degradation
- Disulfide bond reactions in the eukaryotic cytosol and endoplasmic reticulum
- Structure-function relationships of transcription factors
- Protein design, interaction and biophysics

2. Five newer representative publications

- Riemer, J., Appenzeller-Herzog, C., Johansson, L., Bodenmiller, B., Hartmann-Petersen, R. and Ellgaard, L. (2009) A luminal flavoprotein in endoplasmic reticulum-associated degradation. *Proc. Natl. Acad. Sci. USA*, 106, 14831-14836.
- Andersen, KM, Madsen L, Prag S, Johnsen AH, Semple CA, Hendil KB and Hartmann-Petersen (2009). Thioredoxin Txnl1/TRP32 is a redox-active cofactor of the 26 S proteasome. *J. Biol. Chem.* 284, 15246-54.
- Hansen RE, Roth D, Winther JR. (2009) Quantifying the global cellular thiol-disulfide status. *Proc Natl Acad Sci USA*. 2009 Jan 13;106(2): 422-7.
- Kriegenburg F, Seeger M, Saeki Y, Tanaka K, Lauridsen AM, Hartmann-Petersen R, Hendil KB. (2008). In vivo reduction-oxidation state of protein disulfide isomerase: The two active sites independently occur in the reduced and oxidized forms. *Cell*, 135, 355-65.
- Appenzeller-Herzog, C., Riemer, J., Christensen, B., Sørensen, E. S. and Ellgaard, L. (2008) A novel disulfide switch mechanism in Ero1α balances ER oxidation in human cells. *EMBO J.*, 27, 2977-87

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7	4	11
Ph.D.	7	2	9

5. Three important external sources of income/grants (Funding bodies)

FNU, Lundbeck Foundation, NovoNordisk

6. Three important collaborative research contracts/grants (Inter- & national)

Leila Lo Leggio and Jan Jensen, KU
Michael Seeger, Charité—Universitaetsmedizin Berlin, Germany
University of Tübingen, Germany

Group:	Section for Bioinformatics
Department:	Biology
Group Leader:	Anders Krogh, Professor, 35 32 13 29, krogh@binf.ku.dk

1. Description of Research Field

Bioinformatics—biological research using computers—is becoming a cornerstone in biology, as new experimental methods produce data at unprecedented rates. The research of the Bioinformatics Section spans the central dogma of molecular biology: the DNA, RNA and protein worlds. Together, the section groups cover the methodological spectrum from wet-lab and applied data analysis to advanced model building and statistical inference.

2. Five newer representative publications

- Han J, Pedersen JS, Kwon SC, Belair CD, Kim YK, Yeom KH, Yang WY, Haussler D, Blelloch R, Kim VN. Posttranscriptional crossregulation between Drosha and DGCR8. Cell. 2009 Jan 9;136(1):75-84
- Valen E, Pascarella G, Chalk A, Maeda N, Kojima M, Kawazu C, Murata M, Nishiyori H, Lazarevic D, Motti D, Marstrand TT, Tang MH, Zhao X, Krogh A, Winther O, Arakawa T, Kawai J, Wells C, Daub C, Harbers M, Hayashizaki Y, Gustincich S, Sandelin A, Carninci P. Genome-wide detection and analysis of hippocampus core promoters using DeepCAGE. Genome Res. 2009 Feb; 19(2):255-65.
- Boomsma, W., Mardia, KV., Taylor, CC., Ferkinghoff-Borg, J., Krogh, A. and Hamelryck, T. (2008) A generative, probabilistic model of local protein structure. Proc. Natl. Acad. Sci. USA, 105, 8932-8937
- Christiansen, J., Kolte, A.M., Hansen, T.V. & and Nielsen, F.C. (2009). IGF2 mRNA-binding protein - Biological function and putative role in type 2 diabetes. J. Mol. Endocrinol. 43, 187-195.
- Krogh, A. What are artificial neural networks? Nature Biotech., 26(2):195–197, Feb 2008.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	4	0.5	4.5
Assist. Professor	1	1	2
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	3	5
Ph.D.	18	3	21

5. Three important external sources of income/grants (Funding bodies)

Danish Research Councils (for Strategic Research, FSS, FTP, FNU)
Danish National Research Foundation
ERC start-up grant

6. Three important collaborative research contracts/grants (Inter- & national)

FANTOM4/Genome Network Consortium
Danish National Research Foundation Centre for GeoGenetics
Danish Research Council for Technology and Production Sciences (FTP), "Protein design: Development of molecular biology and bioinformatics tools"

Group:	RNA Biology
Department	Biology
Group Leader:	Jan Christiansen, Associate Professor, 35 32 20 08, janchr@bio.ku.dk

1. Description of Research Field

We use molecular, cellular and intact organism approaches to study basic aspects of RNA biology in mammalian systems. Specifically, we study post-transcriptional events such as RNA translatability, localization and stability and the function of small RNA molecules (e.g. miRNA) in developmental decisions.

2. Five newer representative publications

- Christiansen, J., Kolte, A.M., Hansen, T.V. & and Nielsen, F.C. (2009). IGF2 mRNA-binding protein - Biological function and putative role in type 2 diabetes. *J. Mol. Endocrinol.* **43**, 187-195.
- Lillestøl R.K., Shah, S.A., Brügger, K., Redder, P., Phan, H., Christiansen, J**.** & Garrett, R.A. (2009). CRISPR families of the crenarchaeal genus Sulfolobus: bidirectional transcription and dynamic properties. *Mol. Microbiol.* **72**, 259-272.
- Adolph, S.K., DeLotto, R., Nielsen, F.C. & Christiansen, J. (2009). Zygotic expression of *Drosophila* IMP in the developing CNS and PNS. *Gene Expression Patterns* **9**, 138-143.
- Jønson, L.,, Vikesaa, J.,, Krogh, A.,, Nielsen, L.K., Hansen, T.V., Borup, R., Johnsen, A.H., Christiansen, J**.** & Nielsen, F.C. (2007). Molecular composition of IMP1 ribonucleoprotein granules. *Mol. Cell. Proteomics* **6**, 798-811.
- Vikesaa, J., Hansen, T.V., Jønson, L., Borup, R., Wewer, U.M., Christiansen, J. & Nielsen, F.C. (2006). RNA-binding IMPs promote cell adhesion and invadopodia formation. *EMBO J.* **25**, 1456-1468.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	2	2
Ph.D.	1	0	1

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Medical Research Council

Group:	Structural Bioinformatics
Department:	Biology
Group Leader:	Thomas Hamelryck, Assocociate Professor, 35 32 12 78, thamelry@binf.ku.dk

1. Description of Research Field

The structure group develops advanced probabilistic models of protein and RNA structure, using state of the art machine learning methods. These models are used in the prediction and simulation of protein structure and dynamics, and the design of man-made proteins. Applications of our work include drug design and green chemistry - a chemistry based on artificial enzymes, with low energy requirements and without the need for polluting agents.

2. Five newer representative publications

- Hamelryck, T., Kent, J., Krogh, A. (2006) Sampling realistic protein conformations using local structural bias. **PLoS Comput. Biol.**, 2(9): e131
- Boomsma, W., Mardia, KV., Taylor, CC., Ferkinghoff-Borg, J., Krogh, A. and Hamelryck, T. (2008) A generative, probabilistic model of local protein structure. **Proc. Natl. Acad. Sci. USA**, 105, 8932-8937
- Frellsen, J., Moltke, I., Thiim, M., Mardia, KV., Ferkinghoff-Borg, J., Hamelryck, T. (2009) A probabilistic model of RNA conformational space. **PLoS Computational Biology**, 5(6), e1000406
- Cock, P., Antao, T., Chang, J., Chapman, B., Cox, C., Dalke, A., Friedberg, I., Hamelryck, T., Kauff, F., Wilczynski, B., de Hoon, M. (2009) Biopython: freely available Python tools for computational molecular biology and bioinformatics. **Bioinformatics**, 25(11), 1422-1423.
- Hamelryck, T. (2009) Probabilistic models and machine learning in structural bioinformatics. **Statistical Methods in Medical Research**, Review. 18, 505-526.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	0	0
Ph.D.	6	0	6

5. Three important external sources of income/grants (Funding bodies)

Danish Research Council for Technology and Production Sciences (FTP), "Data driven protein structure prediction" Feb 2007-Feb 2010. 3,800,000 DKK (510,200 EUR).
Danish Research Council for Strategic Research (NABIIT), "Simulating proteins on a millisecond time-scale" Sep 2006-Feb 2010. 7,800,000 DKK (1,047,037 EUR).
Danish Research Council for **Technology** and Production Sciences (FTP), "Protein structure ensembles from mathematical models - with application to Parkinson's alpha-synuclein" , Jan 2010-Dec 2012, 4.280.930 DKK.

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Research Council for Technology and Production Sciences (FTP), "Protein design: Development of molecular biology and bioinformatics tools" Sep. 2007-Sep. 2010. 5,600,000 DKK (750,900 EUR). Partner in a project of Jakob R. Winther, Department of Biology, university of Copenhagen.

Group:	Genomics and RNA
Department:	Biology
Group Leader:	Anders Krogh, Professor, 35 32 13 29, krogh@binf.ku.dk

1. Description of Research Field
Analysis of high-throughput sequencing data, comparative RNA analysis, miRNAs, ancient genomics.

2. Five newer representative publications

- E. Valen, A. Sandelin, O. Winther, and A. Krogh. Discovery of regulatory elements is improved by a discriminatory approach. PLoS Comput. Biol., 5(11), 2009.
- Krogh. What are artificial neural networks? Nature Biotech., 26(2):195–197, Feb 2008.
- The FANTOM Consortium (including A. Sandelin, O. Winther, E. Valen, A. Krogh, and others from the Bioinformatics Centre). The transcriptional network that controls growth arrest and differentiation in a human myeloid leukemia cell line. Nature Genetics, 41(5):553–562, 2009.
- Han J, Pedersen JS, Kwon SC, Belair CD, Kim YK, Yeom KH, Yang WY, Haussler D, Blelloch R, Kim VN. Posttranscriptional crossregulation between Drosha and DGCR8. Cell. 2009 Jan 9;136(1):75-84
- Stark A, Lin MF, Kheradpour P, Pedersen JS, Parts L, Carlson JW, Crosby MA, Rasmussen MD, Roy S, Deoras AN, Ruby JG, Brennecke J; Harvard FlyBase curators; Berkeley Drosophila Genome Project, Hodges E, Hinrichs AS, Caspi A, Paten B, Park SW, Han MV, Maeder ML, Polansky BJ, Robson BE, Aerts S, van Helden J, Hassan B, Gilbert DG, Eastman DA, Rice M, Weir M, Hahn MW, Park Y, Dewey CN, Pachter L, Kent WJ, Haussler D, Lai EC, Bartel DP, Hannon GJ, Kaufman TC, Eisen MB, Clark AG, Smith D, Celniker SE, Gelbart WM, Kellis M. Discovery of functional elements in 12 Drosophila genomes using evolutionary signatures. Nature. 2007 Nov 8; 450(7167):219-32.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	0	0.5	0.5
Assist. Professor	0	1	1
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	1	0	1
Ph.D.	5	0	5

5. Three important external sources of income/grants (Funding bodies)
Novo Nordisk Foundation
FSS
Danish National Research Foundation

6. Three important collaborative research contracts/grants (Inter- & national)
Danish National Research Foundation Centre for GeoGenetics
KU star program in statistics
Novo Nordisk Foundation Bioinformatics Centre

Group:	Sandelin
Department:	Biology
Group Leader:	Albin Sandelin, Associate Professor, 35 32 12 85, albin@binf.ku.dk

1. Description of Research Field

Our focus is to understand transcriptional regulation and in particular the regulation and mechanism of transcriptional regulation, using computational methods to mine experimental data from collaborators.

2. Five newer representative publications

- Genome-wide detection and analysis of hippocampus core promoters using DeepCAGE, Valen E, Pascarella G, Chalk A, Maeda N, Kojima M, Kawazu C, Murata M, Nishiyori H, Lazarevic D, Motti D, Marstrand TT, Tang MH, Zhao X, Krogh A, Winther O, Arakawa T, Kawai J, Wells C, Daub C, Harbers M, Hayashizaki Y, Gustincich S, Sandelin A, Carninci P. Genome Res. 2009 Feb;19(2):255-65. Epub 2008 Dec 11.
- A code for transcription initiation in mammalian genomes., Frith MC, Valen E, Krogh A, Hayashizaki Y, Carninci P, Sandelin A., Genome Res. 2008 Jan;18(1):1-12. Epub 2007 Nov 21.
- JASPAR 2010: the greatly expanded open-access database of transcription factor binding profiles., Portales-Casamar E, Thongjuea S, Kwon AT, Arenillas D, Zhao X, Valen E, Yusuf D, Lenhard B, Wasserman WW, Sandelin A. Nucleic Acids Res. 2009 Nov 11. [Epub ahead of print]
- The genome landscape of ERalpha- and ERbeta-binding DNA regions., Liu Y, Gao H, Marstrand TT, Ström A, Valen E, Sandelin A, Gustafsson JA, Dahlman-Wright K., Proc Natl Acad Sci U S A. 2008 Feb 19;105(7):2604-9. Epub 2008 Feb 13. 21.
- Genome-wide analysis of mammalian promoter architecture and evolution., Carninci P, Sandelin A, Lenhard B, Katayama S, Shimokawa K, Ponjavic J, Semple CA, Taylor MS, Engström PG, Frith MC, Forrest AR, Alkema WB, Tan SL, Plessy C, Kodzius R, Ravasi T, Kasukawa T, Fukuda S, Kanamori-Katayama M, Kitazume Y, Kawaji H, Kai C, Nakamura M, Konno H, Nakano K, Mottagui-Tabar S, Arner P, Chesi A, Gustincich S, Persichetti F, Suzuki H, Grimmond SM, Wells CA, Orlando V, Wahlestedt C, Liu ET, Harbers M, Kawai J, Bajic VB, Hume DA, Hayashizaki Y. Nat Genet. 2006 Jun;38(6):626-35.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	1	0	1
Ph.D.	2	0	2

5. Three important external sources of income/grants (Funding bodies)

ERC starting up grant
Novo Nordisk Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

FANTOM4/Genome Network Consortium

Group:	Evolutionary Genetics
Department:	Biology
Group Leader:	Hans R. Siegismund, Associate Professor, 35 32 13 39, HSiegismund@bio.ku.dk

1. Description of Research Field

The research focuses on the evolutionary genetics of large African mammals and viruses. For the mammals, we study the impact of climate change during the Pleistocene on the demographic history and the structure of the species populations. With viruses, the focus is on foot and mouth disease virus, which is endemic in Sub-Saharan Africa. Emphasis is on the evolutionary genetics where the viruses co-evolve in response to their host's immune system. Access to old samples facilitates the use novel approaches to analyze their molecular evolution.

2. Five newer representative publications

- Heller, R., E.D. Lorenzen, J.B.A. Okello, C. Masembe & H.R. Siegismund 2008. Mid-Holocene decline in African buffalos inferred from Bayesian coalescence-based analyses of microsatellites and mitochondrial DNA *Molecular Ecology*, **17**: 4845–4858.
- Hvilsom, C., F. Carlsen, H.R. Siegismund, S. Corbet, E. Nerrienet, A. Fomsgaard 2008. Genetic subspecies diversity of the chimpanzee CD4 virus-receptor gene. *Genomics* **92**: 322–328.
- Okello, J.B.A., G. Wittemyer, H.B. Rasmussen, P. Arctander, S. Nyakaana, I. Douglas-Hamilton, and H. R. Siegismund 2008. Effective population size dynamics reveal impacts of historic climatic events and recent anthropogenic pressure in African elephants. *Molecular Ecology*, **17**: 3788–3799.
- Lorenzen, E.D., C. Masembe, P. Arctander & H.R. Siegismund. 2009. Pleistocene refugia in eastern and southern Africa: insights from mtDNA and the common eland antelope. *Journal of Biogeography*, in press.
- Balinda, S.N., G.J. Belsham, C. Masembe, A.K. Sangula, H.R. Siegismund & V.B Muwanika 2009. Molecular characterization of SAT-2 foot-and-mouth disease virus from post-outbreak slaughtered animals: implications for disease control in Uganda. *Epidemiology and Infection*, accepted.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	0	0
Ph.D.	2	2	4

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council, Danida, EU

6. Three important collaborative research contracts/grants (Inter- & national)

See above.

Group:	Molecular Evolution
Department:	Biology
Group Leader:	Jeppe Vinther, Assistant Professor, 35 32 12 64, jvinther@bio.ku.dk

1. Description of Research Field

Using a combination of computational and experimental methods, we aim at understanding how posttranscriptional regulation influence cellular development, differentiation and carcinogenesis. Specifically, we currently focus on understanding miRNA mediated regulation to characterize the therapeutic potential of miRNA target inhibition and on mapping of the RNA-protein interactome to identify post transcriptional "operons".

2. Five newer representative publications

- Rosenstierne M.W., Vinther, J., Mittler, G., Larsen, L., Mann, M., Norrild, B. (2008). Conserved CPEs in the P53 3' Untranslated Region Influence mRNA Stability and Protein Synthesis. Anticancer Research 28:2553-2560
- Irimia,M., Rukov J.L., Penny,D., Vinther, J., Garcia-Fernandez,J. and Roy,S.W. (2008). Origin of introns by 'intronization' of exonic sequences. Trends Genet. 2008 24(8):378-8
- Garder, P.P. and Vinther,J. (2008). Mutation of miRNA target sequences during human evolution. Trends Genet. 24(6):262-5
- Boyerinas,B., Park,S.M., Shomron,N., Hedegaard,M.M., Vinther,J., Andersen,J.S., Feig,C., Xu,J., Burge,C.B., and Peter,M.E. (2008). Identification of let-7-regulated oncofetal genes. Cancer Res. 68, 2587-2591.
- Weile,C., Gardner,P.P., Hedegaard,M.M., and Vinther,J. (2007). Use of tiling array data and RNA secondary structure predictions to identify noncoding RNA genes. BMC. Genomics 8, 244.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	0	0	0
Assist. Professor	1	0	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	1	1
Ph.D.	2	1	3

5. Three important external sources of income/grants (Funding bodies)

Lundbeck Foundation
Gangsted Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

None at the moment

Section:	Section for Cell and Developmental Biology
Department:	Biology
Section Leader:	Lone Rønnov-Jessen, Associate Professor, D. Sc., 35 32 16 44, lronnov-jessen@bio.ku.dk

1. Description of Research Field

We focus on fundamental biological processes that occur during development or that maintain homeostasis in adult organisms, such as cell proliferation, cell volume regulation, cell signalling and signal transduction, cytoskeletal organisation, cell differentiation, cell-cell interaction, matrix modulation and programmed cell death. If these processes are somehow disturbed, development may be impaired or diseases may develop. We therefore in addition focus on cellular changes that underlie human pathologies including autoimmunity, obesity, ciliopathies and cancer.

2. Five newer representative publications

- Wang, J., Wang, W., Li, R. , Kristiansen, K. et al. (2008). The diploid genome sequence of an Asian individual. Nature 456, 60-65. (Impact factor: 31.434)
- Krejsgaard T, Vetter-KauczokCS, Woetmann A, Kneitz H, Eriksen KW, Lovato P, Zhang Q, WasikMA,Geisler
- C, Ralfkiaer E, Becker JC, Ødum N. Ectopic expression of B lymphoid kinase in cutaneous T-cell lymphoma.
- Blood, 2009, 113(23):5896-904. (Impact factor: 10.9)
- Schneider L, Stock CM, Dieterich P, Satir P, Schwab A, Christensen ST, Pedersen SF. (2009). The Na+/H+ exchanger, NHE1, plays a central role in directed fibroblast migration stimulated by PDGFRα signalling in the primary cilium. J. Cell Biol., 185(1):163-76. (Impact factor: 12.480)
- Hoffmann, E.K., Lambert, I.H., Pedersen, S.F. (2009) Physiology of Cell Volume Regulation in Vertebrates. Physiological Reviews. 89(1):193-277. (Impact factor: 29.600)
- Rønnov-Jessen, L. and Bissell, M. J. (2009) Breast cancer by proxy: Can the microenvironment be both the cause and the consequence? Trends in Molecular Medicine (Cell press), 15:5-13. (Impact factor: 9.621)

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	5	1	6
Assoc. Professor	8	0.2	8.2
Assist. Professor	0	0	1
Post-doc	0	10	10

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	26	20	46
Ph.D.	13	17	30

5. Three important external sources of income/grants (Funding bodies)

Please see list of individual groups in Cell and Developmental Biology

6. Three important collaborative research contracts/grants (Inter- & national)

Please see list of individual groups in Cell and Developmental Biology

Group:	Cancer Cell Signaling
Department:	Biology
Group Leader:	Martin W. Berchtold, Professor, 35 32 20 89, mabe@bio.ku.dk

1. Description of Research Field

Our research focuses on the structure and function of Ca2+ binding proteins and their significance in the signaling pathways important for cell growth, cell death, intracellular trafficking, and osmoregulation. Our experimental work includes genetic, cell biology and biochemical studies on the multifunctional calcium receptor calmodulin and ALG-2, a protein involved in apoptosis.

2. Five newer representative publications

- la Cour J.M., Mollerup J., Berchtold M.W. ALG-2 oscillates in subcellularlocalization, unitemporally with calcium oscillations. Biochem Biophys Res. Commun. 353, 1063-7 (2007)
- Dræby I., Woods Y.L., la Cour J.M., Mollerup J., Bourdon J.C. and Berchtold M.W. The calcium binding protein ALG-2 binds and stabilizes Scotin, a p53- inducible gene product localised at the endoplasmic reticulum membrane. Arch. Biochem. Biophys, 467, 87-94 (2007)
- la Cour J.M., Høj B.R., Mollerup J., Simon R., Sauter G. and Berchtold M.W. The apoptosis linked gene ALG-2 is dysregulated in tumors of various origin and contributes to cancer cell viability, Molecular Oncology, 1, 431-439 (2008)
- Høj B.R., la Cour J.M., Mollerup J., and Berchtold M.W.ALG-2 knockdown in HeLa cells results in G2/M cell cycle phase accumulation and cell death. Biochem Biophys Res. Commun 378, 145-148 (2009)
- Douglas Galsgaard, E.D., Bruun Rasmussen, B.R., Folkesson, CH.G.,Rasmussen,L.M. Berchtold, M.W., Leif Christensen, L. and Panina, S.Re-evaluation of the human prolactin receptor expression in human breast. Cancer. J. Endocrinology 201, 1-15 (2009)

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	0	0	0
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	1	3
Ph.D.	0	2	2

5. Three important external sources of income/grants (Funding bodies)

Danish Cancer Society 2004 - 2008: 1.200.000 Kr.; 2010 – 2012: 1.000.500 Kr.
FNU: 2009 – 2011: 900.000 Kr.
FSS (with SFP and EKH), 2010- 2012: sum not yet known (4.11.09)

6. Three important collaborative research contracts/grants (Inter- & national)

The Danish Council for Independent Research: FNU (Det Frie Forskningsråd for Natur og Univers), FSS (Det Frie Forskningsråd for Sundhed og Sygdom)

Group:	Cilia group
Department:	Biology
Group Leaders:	Søren Tvorup Christensen, Associate Professor, 35 32 17 05, stchristensen@bio.ku.dk Lotte Bang Pedersen, Associate Professor, 35 32 16 90, lbpedersen@bio.ku.dk

1. Description of Research Field

Our group studies the assembly and function of mammalian primary cilia, which are solitary, antennae-like structures that emerge from the surface of almost all mammalian cell types, and which regulate cell cycle entry, differentiation and migration of cells during embryogenesis, fetal development and in tissue homeostasis. Our research topics include the molecular mechanisms of ciliary assembly and how primary cilia coordinate complex signaling pathways such as PDGF, Hedgehog and Wnt signaling in cancer, stem cell differentiation, tissue regeneration and organogenesis, including heart and brain development.

2. Five newer representative publications

- CA, Kristensen SG, Møllgård K, Pazour GJ, Yoder BK, Larsen LA, Christensen ST. The primary cilium coordinates early cardiogenesis and hedgehog signaling in cardiomyocyte differentiation. J Cell Sci. 2009, 122:3070-3082
- Schneider L, Stock CM, Dieterich P, Jensen BH, Pedersen LB, Satir P, Schwab A, Christensen ST, Pedersen SF. The Na+/H+ exchanger NHE1 is required for directional migration stimulated via PDGFR in the primary cilium. J Cell Biol. 2009, 185(1):163-176.
- Pedersen LB, Rosenbaum JL. Intraflagellar transport (IFT) role in ciliary assembly, resorption and signaling. Curr Top Dev Biol. 2008, 85:23-61.
- Christensen ST, Pedersen SF, Satir P, Veland IR, Schneider L. The primary cilium coordinates signalling pathways in cell cycle control and migration during development and tissue repair. Curr Top Dev Biol. 2008, 85:261-301.
- Schrøder JM, Schneider L, Christensen ST, Pedersen LB. EB1 is required for primary cilia assembly in fibroblasts. Curr Biol. 2007, 17:1134-1139.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	5	3	8
Ph.D.	4	1	5

5. Three important external sources of income/grants (Funding bodies)

Lundbeck Foundation
Danish Cancer Society (Kræftens Bekæmpelse)
The Danish Natural Research Council

6. Three important collaborative research contracts/grants (International)

Bradley K. Yoder, Dept. of Cell Biology, University of Alabama at Birmingham, School of Medicine, Birmingham, AL, USA
Anna Akhmanova and Gert Jansen, Dept. of Cell Biology, Erasmus Medical Center, Rotterdam, Netherlands
Peter Satir, Dept. Anatomy and Structural Biology, Albert Einstein College of Medicine of Yeshiva University, Bronx, NY, USA.

Group:	Cell Physiology and Biology
Department:	Biology
Group Leader:	Else K. Hoffmann, Professor, 35 32 16 95, ekhoffmann@bio.ku.dk

1. Description of Research Field

The group focuses on fundamental biological homeostatic processes such as cell proliferation, migration, differentiation, and programmed cell death. Emphasis is on how these processes are controlled through interactions between specific membrane transport proteins, cell adhesion molecules, plasma membrane receptors, and their binding partners and associated signalling pathways, and how these events in turn influence important physiological and pathophysiological conditions during development and in tissue homeostasis.

2. Five newer representative publications

- **Poulsen KA, Andersen EC, Hansen CF, Klausen TK,** Hougaard C**, Lambert IH and Hoffmann EK**(2009). Deregulation of apoptotic volume decrease and ionic movements in Multidrug resistant tumor cells: Role of chloride channels. Am. J Physiol. Cell Physiol. Oct 21 (Epub ahead of print).
- **Rønnov-Jessen, L.** and Bissell, M. J. (2009). Breast cancer by proxy; Can the microenvironment be both the cause and the consequence? , Trends in Molecular Medicine (Cell press) 15:5-13. **Schneider L,** Stock CM ,Dieterich P, Satir P, Schwab A, **Christensen ST, Pedersen SF. (**2009). The Na^+/H^+ exchanger, NHE1, plays a central role in directed fibroblast migration stimulated by PDGFRα signalling in the primary cilium. *J. Cell Biol.,* 185(1):163-76
- **Hoffmann, E.K., Lambert, I.H., Pedersen, S.F.** (2009) Physiology of Cell Volume Regulation in Vertebrates. Physiological Reviews. 89(1):193-277.
- Villadsen*, R., Fridriksdottir*, A. J., **Rønnov-Jessen, L**., Gudjonsson, T., Rank F., LaBarge, M., Bissell, M. J., Petersen, O. W. (2007). Evidence for a stem cell hierarchy in the adult human breast. *J. Cell. Biol*.:177(1): 87-101 *shared first authorship.
- **Lambert, I.H.** (2007) Activation and inactivation of the volume-sensitive taurine leak pathway in NIH3T3 fibroblasts and Ehrlich Lettre ascites cells. Am. J. Physiol. Cell Physiol. 293: C390-C400.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	3	0	3
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	14	8	22
Ph.D.	5	0	5

5. Three important external sources of income/grants (Funding bodies)

The Danish Cancer Society, FSS, FNU, Hjerteforeningen, Novo, Lundbeck, Carlsberg Foundation.

6. Three important collaborative research contracts/grants (Inter- & national)

Japan Science and Technology Agency (JST) and Danish Agency for Science Technology and Innovation (DASTI): Molecular medical research.

SFP, Birthe B. Kragelund, Århus Universitet, og Kræftens Bekæmpelse

PEPFISH is a research project with focus on utilization of bioactive peptides from fish processing. PEPFISH is granted by the Danish Council for Strategic Research and it started on 1. April 2008. The project period is close to 4 years. PEPFISH has 8 partners in Denmark, Norway and Sweden.

Group:	Genomics and Molecular Biomedicine
Department:	Biology
Group Leaders:	Karsten Kristiansen, Professor, 35 32 44 43, kk@bio.ku.dk

1. Description of Research Field

The Laboratory of Genomics and Molecular Biomedicine uses a combination of large scale genomics/metagenomics and bioinformatics analyses with state of the art molecular biology to unravel molecular mechanisms involved in common human diseases. The projects are in particular focused on mechanisms controlling energy metabolism and homeostasis and the link between obesity and cancer. In addition the laboratory is involved in several evolutionary large scale genomics projects.

2. Five newer representative publications

- Madsen, L., Pedersen, L.M.; Liaset, B. Ma, T., Petersen, R.K.; van den Berg, S., Pan, J.; Müller-Decker, K., Dülsner, E.D., Kleemann, R., Kooistra, T., Døskeland S.O. & Kristiansen, K. (2008). cAMP-depending signaling regulates the adipogenic effect of n-6 polyunsaturated fatty acids. J. Biol. Chem. *283*, 7196-7205.
- Petersen, R.K., Madsen, L., Pedersen, L.M., Hallenborg, P., Hagland, H., Viste, K., Døskeland, S.O. & Kristiansen, K. (2008) cAMP-mediated induction of adipocyte differentiation requires the synergistic action of Epac- and PKA-dependent processes. Mol. Cell. Biol. *28*, 3804-3816.
- Wang, J., Wang, W., Li, R. , Kristiansen, K. et al. (2008). The diploid genome sequence of an Asian individual. Nature *456*, 60-65.
- Li, R., Li, Y., Fang, X., Yang, H, Wang, J., Kristiansen, K. & Wang, J. (2009). SNP detection for massively parallel whole-genome resequencing. Genome Res. *19,* 1124-1132.
- Li, R., Yu, C., Li, Y., Lam, T.W., Yiu, S.M., Kristiansen, K. & Wang, J. (2009). SOAP2: an improved ultrafast tool for short read alignment. Bioinformatics *25*, 1966-1967.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	2	0.2	2.2
Assist. Professor	0	0	0
Post-doc	0	5	5

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	3	4	7
Ph.D.	1	10	11

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
Lundbeck Foundation
EU 7th framework

6. Three important collaborative research contracts/grants (Inter- & national)

The Lundbeck Centre for Applied Medical Genomics in Personalized Disease Prediction, Prevention and Care (LuCAMP). Supported by the Lundbeck Foundation.
Metagenomics of the Human Intestinal Tract (MetaHIT). Supported by the EU 7th Framework program.
Sino-Danish Breast Cancer Centre. Supported by the Danish National Research Foundation.

Group:	Immunology (Inflammation and Cancer Group)
Department:	Biology
Group Leader:	Niels Feentved Ødum, Professor, 35 32 78 79, ndum@sund.ku.dk

1. Description of Research Field

We focus on the disturbed regulation of lymphocytes and neoplastic T cells in inflammation and cancer. We wish to find ways to break the immune privilege (tolerance) of cancers and to restore tolerance in autoimmunity. Our goal is to discover molecular targets for treatment of chronic inflammation and cancer.

2. Five newer representative publications

- Krejsgaard T, Vetter-KauczokCS, **Woetmann A**, Kneitz H, Eriksen KW, Lovato P, Zhang Q, Wasik MA,Geisler, C, Ralfkiaer E, Becker JC, **Ødum N**. Ectopic expression of B lymphoid kinase in cutaneous T-cell lymphoma. Blood, 2009, 113(23):5896-904 (Impact factor = 10.9)
- Boding L, Bonefeld CM, Nielsen BL, Lauritsen JPH, von Essen MR, Hansen AK, Larsen JM, Nielsen MM, **Ødum N**, Geisler C. TCR down-regulation controls T cell homeostasis. J Immunol 2009, in press. (Impact factor = 6.0)
- Krejsgaard T, Gjerdrum LM, Lauenborg B, Eriksen KW, Mathiesen A-M, Bovin LF, Ryder LP, Ralfkiaer E, Qian Z, Wasik MA, **Ødum N** , **Woetmann A**. Malignant T cells express low molecular spliceforms of FoxP3 and function as regulatory T cells in Sezary Syndrome. Leukemia. 2008(12):2230-9. (Impact factor = 8.6)
- Marzec M, Liu X, Kasprzycka M, Witkiewicz A, Raghunath PN, El-Salem M, Robertson E, **Ødum N**, Wasik MA. IL-2- and IL-15-induced activation of the rapamycin-sensitive mTORC1 pathway in malignant CD4+ T lymphocytes. Blood, 2008;111:2181-9. (Impact factor = 10.9)
- **Woetmann A**, Lovato P, Eriksen KW, Krejsgaard T, Labuda T, Zhang Q, Mathiesen A-M, Geisler C, Svejgaard A, Wasik MA, **Ødum N**. Nonmalignant T cells stimulate growth of T-cell lymphoma cells in the presence of bacterial toxins. Blood. 2007;109:3325-32. (Impact factor = 10.9)

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	1	0	1
Assist. Professor	0	1	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	4	6
Ph.D.	3	4	7

5. Three important external sources of income/grants (Funding bodies)

Research Council (2009), 500.000 kr
Private funding (Lundbeck, NOVO, KB), 1.900.000
Danish National Advanced Technology Foundation (main PI)

6. Three important collaborative research contracts/grants (Inter- & national)

Advanced Technology Foundation "miRNA as novel diagnostic tools in inflammatory skin diseases), PI:Niels Ødum – (9.400.000 kr over 4 years) (external partners: Rigshospitalet, Gentofte Hospital, LEO Pharma A/S and Exiqon A/S).
Strategic Research Council: *Development and clinical evaluation of new strategies for adoptive cell transfer (ACT) in the treatment of cancer",* with Per thor Straten (Herlev Hospital) as PI. Niels Ødum's share is 2.025.000 kr. during 2010-2013 (total budget: 12.664.496 kr.) Other participants in the consortium: Netherlands Cancer Institute, Amsterdam, Institute for cancer research, OSLO, Adaptimmune, Oxford.

Section:	Molecular Integrative Physiology
Department:	Biology
Section and Group Leader:	Carsten Juel, Professor, 35 32 16 82 cjuel@bio.ku.dk

1. Description of Research Field

The section includes researchers working on biomembranes, physical activity and adaptation, and various epithelia. The overall aim of the physiology section is to integrate the information from molecular level to complex organism level. The preparations include various heterologous expression systems in yeast, oocytes, cell lines, as well as preparation from amphibia, genetically modified mice, rats and human. Together, the physiology section utilizes techniques including molecular and protein biology, electrophysiology, bioimaging and computational models.

2. Five newer representative publications

- Kiilerich K, Gudmundsson M, Birk JB, Lundby C, Taudorf S, Plomgaard P, Saltin B, Pedersen PA, Wojtaszewski JFP, Pilegaard H. Low Muscle Glycogen and Elevated Plasma FFA Modify but does not Prevent Exercise-induced PDH Activation in Human Skeletal Muscle. Diabetes, On line Oct.2009.
- Leick L, Hellsten Y, Fentz J, Lyngby SS, Wojtaszewski JF, Hidalgo J, Pilegaard H. PGC-1α mediates exercise-induced skeletal muscle VEGF expression in mice. Am J Physiol 297:E92-103, 2009.
- Hansen MR, Krabbe S, Ankorina-Stark and Novak I (2009) Purinergic receptors stimulate Na^+/Ca^{2+} exchange in pancreatic duct cells: possible role of proteins handling and transporting Ca^{2+}. Cell Physiol Biochem 23:378-396.
- Juel, C (2009) Na+,K+-ATPase in rat skeletal muscle: muscle fiber-specific differences in exercise-induced changes in ion-affinity and muscle activity. Am J Physiol 296: R125-R132.
- Hammami S, NJ Willumsen, HL Olsen, FJ Morera, R Latorre, DA Klaerke (2009). Cell volume and membrane stretch independently control K^+ channel activity. J.Physiol 587.10:2225-2231.
- Halberg KA, Persson D, Ramløv H, Westh P, Kristensen RM, Møbjerg N. 2009. Cyclomorphosis in Tardigrada: Adaptation to environmental constraints. *J Exp Biology* 212: 2803-2811.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	4 (3 with special duties)	0	4
Assoc. Professor	3	1	4
Assist. Professor	1 (on leave)	0	1
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7	9	16
Ph.D.	8	2	10

5. Three important external sources of income/grants (Funding bodies)

FSS: 1.7 million (2008-2010)
Lundbeck Foundation: 700.000 kr. (2009-2010)
The Danish Agency for Science, Technology and Innovation (Industrial PhD. and grant)

6. Three important collaborative research contracts/grants (Inter- & national)

Danish National Research Foundation Centre: Center for Inflammation and Metabolism
Collaboration with Prof. *Kazuhide Inoue*, Dept. Molecular and System Pharmacology, Kyushu University, Fukuoka, Japan, and with Prof. *H. Matsuda* and *M. Okada*, Department of Physiology, Kansai Medical University, Osaka. Nordic Bioscience, Roskilde University.

Section:	Cell and Neurobiology/Center for Functional and Comparative Insect Genomics
Department:	Biology
Section and Group Leader:	Cornelis (Cok) Grimmelikhuijzen, Professor, 35 32 12 27, cgrimmelikhuijzen@bio.ku.dk

1. Description of Research Field

We are actively involved in many insect genomics projects world-wide. Our focus is on the neurobiology of insects, especially on G protein-coupled receptors (GPCRs) and their ligands (biogenic amines, protein hormones, and neuropeptides). We annotate these GPCRs in the newly sequenced insect genomes, express them in mammalian cells in cell culture, and characterize (deorphanize) them. We also have created GPCR gene disruption mutants in the fruitfly Drosophila melanogaster and the red flour beetle Tribolium castaneum and are analyzing their phenotypes.

2. Five newer representative publications

- G.M. Weinstock et al., F. Hauser, G. Cazzamali, M. Williamson, C.J.P. Grimmelikhuijzen et al. (The Honey Bee Genome Sequencing Consortium) (2006). Insights into social insects from the genome of the honey bee Apis mellifera. Nature, 344, 931-949.
- B. Li, R. Predel, S. Neupert, F. Hauser, Y. Tanaka, G. Cazzamali, M. Williamson, Y. Arakane, P. Verleyen, L. Schoofs, J. Schachtner, C. J. P. Grimmelikhuijzen and Y. Park (2008). Genomics, transcriptomics, and peptidomics of neuropeptides and protein hormones in the red flour beetle Tribolium castaneum. Genome Res., 18, 113-122.
- F. Hauser, G. Cazzamali, M. Williamson, Y. Park, B. Li, Y. Tanaka, R. Predel, S. Neupert, J. Schachtner, P. Verleyen and C. J. P. Grimmelikhuijzen (2008). A genome-wide inventory of neurohormone GPCRs in the red flour beetle Tribolium castaneum. Front. Neuroendocrinol., 29, 142-165.
- E. Stafflinger, K. K. Hansen, F. Hauser, M. Schneider, G. Cazzamali, M. Williamson and C. J. P. Grimmelikhuijzen (2008). Cloning and identification of an oxytocin/vasopressin-like receptor and its ligand from insects. Proc. Natl. Acad. Sci. USA, 105, 3262-3267.
- S. Richards, et al., C. J. P. Grimmelikhuijzen, F. Hauser, G. Cazzamali, M. Williamson, et al. (The Tribolium Genome Sequencing Consortium) (2008). The genome sequence of the model beetle and pest Tribolium castaneum. Nature, 452, 949-955.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	0	2
Assist. Professor	1	1	2
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	8	12
Ph.D.	1	1	2

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (FNU-Center, 2006-2010)
Novo Nordisk Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Honey Bee, Bumble Bee, Tribolium, Nasonia, Pea Aphid, Tick, and Daphnia Genome Sequencing Consortia.

Group:	Microbiology Section
Department:	Biology
Section and Group Leader:	Søren J. Sørensen, Professor, 35 32 20 59, sjs@bio.ku.dk

1. Description of Research Field

The research aims at evaluating the extent of genetic flow in natural microbial communities and the community responses to environmental perturbations. We intend to understand the interactions in natural microbial communities by advanced molecular techniques. A new high throughput sequencing facility with the capacity to sequence up to 2 billion bases per day forms together with cutting edge technologies such as quantitative PCR and Flow Cytometry the basis for the experimental work.

2. Five newer representative publications.

- Norman, A., Hansen, L.H., She, Q. and Sørensen, S. J. 2008 Nucleotide sequence of pOLA52: a conjugative IncX1 plasmid from *Escherichia coli* which enables biofilm formation and multidrug efflux. Plasmid. 60(1), p 59-74.
- Norman, A., Hansen, L.H. and Sørensen, S. J 2009 Conjugative plasmids: vessels of the communal gene pool. Philosophical Transactions of the Royal Society B. 364, p 2275-2289.
- Singh B.K. Campbell C.D. Sørensen S. J. and Zhou J. 2009 Soil genomics is the way forward.
- Nature Reviews Microbiology Oct 7. 10, p 756.
- Bahl, M.I., Burmølle, M., Meisner, A., Hansen L.H.and Sørensen,S.J. 2009 All IncP-1 plasmid subgroups, including the novel ε subgroup, are prevalent in the influent of a Danish wastewater treatment plant. Plasmid. 62, p 134-139.
- Marchante, E, Kjøller, A., Struwe, S. and Freitas, H. 2009 Soil recovery after removal of the N2-fixing invasive *Acacia longifolia*: consequences for ecosystem restoration. Biological Invasion. 11(4), p 813-823.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	0	4	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	9	3	12
Ph.D.	7	3	10

5. Three important external sources of income/grants (Funding bodies)

2009-2011, FNU Mobile genetic elements, 4,4 mio kr
2009-2012, Strategic Research Council FøSu –Popcorn, 2,1 mio kr
2010-2012, The Danish Food Industry Research Programme 2009 – OstUnik, 2,1 mio kr

6. Three important collaborative research contracts/grants (Inter- & national)

2009-2013, F&I Infrastructure: Sequencing center (25 mio. kr)
2008-2014, EU FW 7 "METAEXPLORE" (Co-PI) (50 mio. kr)
2004-2012, Villum Kann Rasmussen Fonden: "CLIMAITE – Climate change effects on biological processes in terrestrial ecosystems" (40 mio. kr)

Group:	Section of Terrestrial Ecology
Department:	Biology
Section Leader:	Rasmus Kjøller, Assistant Professor, 35 32 23 11, rasmusk@bio.ku.dk

1. Description of Research Field

Key words: biogeochemical cycling, temperate and arctic terrestrial ecosystems, physiological ecology, ^{15}N and ^{13}C patterns, environmental (climate) changes, UV-B radiation, plant-microbe-soil interactions, C/N balance, decomposition, predator-prey interaction, aboveground-belowground ecology, protozoa and nematodes, molecular (454 pyrosequencing-based) community ecology and population and evolutionary genetics of symbiotic fungi, mycorrhizal fungi.

2. Five newer representative publications (group members in bold)

- Ekelund F, Saj S, **Vestergard M**, Bertaux J, Mikola J (2009) The "soil microbial loop" is not always needed to explain protozoan stimulation of plants .SOIL BIOLOGY & BIOCHEMISTRY 41, 2336-2342.
- **Olsrud M.,** Carlsson B.Å., Svensson B.M., **Michelsen A.**, Melillo J.M. (2009). Responses of fungal root colonization, plant cover and leaf nutrients to long-term exposure to elevated atmospheric CO_2 and warming in a subarctic birch forest understory. *Global Change Biology. DOI:* 10.1111/j.1365-2486.2009.02079.x
- **Rosendahl S**, Mcgee P, Morton JB (2009) Lack of global population genetic differentiation in the arbuscular mycorrhizal fungus Glomus mosseae suggests a recent range expansion which may have coincided with the spread of agriculture. MOLECULAR ECOLOGY 18: 4316-4329
- **Bjornlund L, Ronn R**, Pechy-Tarr M, Maurhofer M, Keel C, Nybroe O (2009) Functional GacS in Pseudomonas DSS73 prevents digestion by Caenorhabditis elegans and protects the nematode from killer flagellates. ISME JOURNAL 3, 770-779.
- Klumpp A. & **Ro-Poulsen, H**. (2010). Biomonitoring of Toxic Compounds of Airborne Particulate Matter in Urban and Industrial Areas. 18pp. In: Fathi Zereini & Clare Wiseman (eds): Urban Airborne Particulate Matter: Origins, Chemistry, Fate and Health Impact. Springer Verlag *in press*.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	5	0	5
Assist. Professor	0	0	0
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12½	0	12½
Ph.D.	2½	2½	5

5. Three important external sources of income/grants (Funding bodies)

European Union
Carlsberg Foundation
Research council (FNU)

6. Three important collaborative research contracts/grants (Inter- & national)

CLIMAITE (Villum Kann Rasmussen). Risoe, Faculty of Life Sciences, University of Aarhus.
SOILSERVICE (EU FP7). 11 groups in 10 European countries
MIRESOWA (Strategic Res. Council.). GEUS, DTU, AU-NERI, Catholic University Leuven, Flemish Institute for Technological Research, and nine other non-academic institutions.

Group:	Soil Biology
Department:	Biology
Group Leader:	Søren Christensen, Professor, 35 32 21 56, christensen@bio.ku.dk

1. Description of Research Field

The biodiversity of soil organisms is not surpassed by that of any other environment. We deal with the biological decomposition process and the dynamics between microorganisms and the protozoa and nematodes eating the microorganisms. This predator-prey interaction occurs in the small separate micro sites that characterize the soil environment. Understanding this spatial dynamic is pivotal to our understanding of aboveground-belowground interactions in terrestrial ecosystems under global change.

2. Five newer representative publications (group members in bold)

- **Bjornlund L, Ronn R**, Pechy-Tarr M, Maurhofer M, Keel C, Nybroe O (2009) Functional GacS in Pseudomonas DSS73 prevents digestion by Caenorhabditis elegans and protects the nematode from killer flagellates. ISME JOURNAL 3, 770-779.
- Pedersen AL, Nybr oe O, Winding A, Ekelund F Bjornlund L (2009) Bacterial Feeders, the Nematode Caenorhabditis elegans and the Flagellate Cercomonas longicauda, have different Effects on Outcome of Competition among the Pseudomonas Biocontrol Strains CHA0 and DSS73 MICROBIAL ECOLOGY 57 501-509.
- Ekelund F, Saj S, **Vestergard M**, Bertaux J, Mikola J (2009) The "soil microbial loop" is not always needed to explain protozoan stimulation of plants .SOIL BIOLOGY & BIOCHEMISTRY 41, 2336-2342.
- Saj S, Mikola J, Ekelund F (2009) Species-specific effects of live roots and shoot litter on soil decomposer abundances do not forecast plant litter-nitrogen uptake, OECOLOGIA 161, 331-341.
- Wim H. van der Putten, R. D. Bardgett, P. C. de Ruiter, W. H. G. Hol, K. M. Meyer, T. M. Bezemer, M. A. Bradford, **S. Christensen**, M. B. Eppinga, T. Fukami, L. Hemerik, J. Molofsky, M. Schädler, C. Scherber, S. Y. Strauss, M. Vos and D. A. Wardle (2009) Empirical and theoretical challenges in aboveground-belowground ecology OECOLOGIA 161, 1-14.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	0	4
Ph.D.	2	0	2

5. Three important external sources of income/grants (Funding bodies)

European Union, Carlsberg Foundation, Ministry of Food, Agriculture and Fisheries

6. Three important collaborative research contracts/grants (Inter- & national)

CLIMAITE (Villum Kann Rasmussen). Risoe, Faculty of Life Sciences, University of Aarhus.
SOILSERVICE (EU FP7). 11 groups in 10 European countries
MIRESOWA (Strategic Res. Council.). GEUS, DTU, AU-NERI, Catholic University Leuven, Flemish Institute for Technological Research, and nine other non-academic institutions.

Group:	Physiological Ecology
Department:	Biology
Group Leader:	Anders Michelsen, Associate Professor, 35 32 22 70, andersm@bio.ku.dk

1. Description of Research Field

The research field is general and physiological ecology in terrestrial systems, the study of interactions between ecosystem components, and physiological processes in soil organisms and plants. Biological and biogeochemical responses to natural environmental variation and to global and regional environmental changes and disturbances as climate change, UV-B radiation and air pollution are studied. Focus is on processes in the plant-microbe-soil interface, C and N cycling and analysis of ^{15}N and ^{13}C patterns in the arctic and temperate zone.

2. Five newer representative publications (group members in bold)

- **Andresen L.C**., **Michelsen A**., Ambus P., **Jonasson S**. and Beier C. (2009) Glycine uptake in heath plants and soil microbes responds to elevated temperature, CO_2 and drought. *Acta Oecologia*. 35, 786-796
- **Olsrud M.,** Carlsson B.Å., Svensson B.M., **Michelsen A**., Melillo J.M. (2009). Responses of fungal root colonization, plant cover and leaf nutrients to long-term exposure to elevated atmospheric CO_2 and warming in a subarctic birch forest understory. *Global Change Biology*
- Klumpp A. & **Ro-Poulsen, H**. (2010). Biomonitoring of Toxic Compounds of Airborne Particulate Matter in Urban and Industrial Areas. 18pp. In: Fathi Zereini & Clare Wiseman (eds): Urban Airborne Particulate Matter: Origins, Chemistry, Fate and Health Impact. Springer Verlag *in press*.
- **Olsrud M**. & **Michelsen A**. (2009). Effects of shading on photosynthesis, plant organic nitrogen uptake and root fungal colonization in a subarctic mire ecosystem. *Botany* 87: 463–474
- **Rinnan R**., **Michelsen A**., **Jonasson S.** (2008). Effects of litter addition and warming on soil carbon, nutrient pools and microbial communities in a subarctic heath ecosystem. *Applied Soil Ecology* 39, 271-281.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7½	0	7½
Ph.D.	½	1½	2

5. Three important external sources of income/grants (Funding bodies)

Villum Kann Rasmussen Foundation
Danish Natural Science Research Council
European Union (Marie Curie)

6. Three important collaborative research contracts/grants (Inter- & national)

CLIMAITE. Villum Kann Rasmussen Foundation 2009-2012, 1.631.000,-
Environmental Controls on Plants, Microbes…DNSRF 2007-2009, 792.000,-
Ericoid Mycorrhizas and Carbon Biogeochemistry.. (MCF-ERICA*).* Marie Curie, 2007-2010, 1.417.000,-

Group:	Mycology
Department:	Biology
Group Leader:	Søren Rosendahl, Professor, 35 32 23 14, soerenr@bio.ku.dk

1. Description of Research Field

We study the molecular ecology of symbiotic fungi, recently taken advance of the new sequencing technology (454 pyrosequencing). Both community and population genetic studies of mycorrhizal, pathogenic and parasitic fungi are studied. Studies are based on environmental samples from plant roots or soil. DNA sequence based genetic markers are developed and used for determining genetic structure of fungal populations and communities.

2. Five newer representative publications (group members in bold)

- **Rosendahl S**, Mcgee P, Morton JB (2009) Lack of global population genetic differentiation in the arbuscular mycorrhizal fungus Glomus mosseae suggests a recent range expansion which may have coincided with the spread of agriculture. MOLECULAR ECOLOGY 18: 4316-4329
- **Lihme M**, Jensen AB, **Rosendahl S** (2009) Local scale population genetic structure of Entomophthora muscae epidemics. FUNGAL ECOLOGY 2: 81-86
- **Mikkelsen BL**, **Rosendahl S**, Jakobsen I (2008) Underground resource allocation between individual networks of mycorrhizal fungi. NEW PHYTOLOGIST 180: 890-898
- Abarenkov K, Nilsson RH, Larsson K-H, Alexander IJ, Eberhardt U, Erland S, Høiland K, **Kjøller R**, Larsson E, Pennanen T, Sen R, Taylor1 AFS, Tedersoo L, Ursing BM, Vrålstad T, Liimatainen K, Peintner U, Kõljalg U (2010) The UNITE database for molecular identification of fungi – recent updates and future perspectives. accepted for publication in New Phytologist
- **Kjøller R**, Olsrud M, Michelsen A (2009) Co-existing ericaceous plant species in a subarctic mire community share fungal root endophytes. Fungal Ecology doi:10.1016/j.funeco.2009.10.005

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	1	0	1
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	1	0	1
Ph.D.	0	1	1

5. Three important external sources of income/grants (Funding bodies)

Carlsberg Foundation (454-pyrosequencing studies
European Union (Marie Curie Post Doc grant)
Strategic Research Council (MIRESOWA project)

6. Three important collaborative research contracts/grants (Inter- & national)

Fungi in boreal forest (NordForsk metagenomics network: partners in Norway, Sweeden, Finland, Estonia, UK, and the Netherlands).
FESIN (NSF metagenomics network, partners in US and Europe including DK).
MIRESOWA (Strategic Res. Council.). GEUS, DTU, AU-NERI, Catholic University Leuven, Flemish Institute for Technological Research, and nine other non-academic institutions.

Group:	Section for Ecology and Evolution
Department:	Biology
Section Leader:	Jacobus J. (Koos) Boomsma, Professor, 35 32 13 40, JJBoomsma@bio.ku.dk

1. Description of Research Field

The Section consists of four Research Groups: 1. Animal Behaviour; 2. Biodiversity and Macroecology, including the Center for Macroecology & Evolution; 3. Population Ecology; 4. The DG Centre for Social Evolution. Research addresses fundamental questions about: 1. the evolution and mechanisms of communication; 2. patterns of biodiversity and the implications of climate change; 3. the dynamics and co-evolution of interacting populations; 4. the evolution of social behaviour.

2. Five newer representative publications

- Aanen, D.K., de Fine Licht, H.H., Debets, A.J.M., Kerstes, N.A.G., Hoekstra, R.F., and Boomsma, J.J. (2009). High Symbiont Relatedness Stabilizes Mutualistic Cooperation in Fungus-Growing Termites. ***Science*** 326(5956), 1103-1106.
- Boomsma, J.J. (2009). Lifetime monogamy and the evolution of eusociality. ***Philosophical Transactions of the Royal Society*** B 364, 3191-3207.
- Graham, C. H., Parra, J. L., Rahbek C., and McGuire, J.A. (2009). Phylogenetic structure in tropical hummingbird communities. ***Proceedings of the National Academy of Sciences, USA*** 106**:** 19673-19678.
- Matessi, G., Matos, J., Peake, T.M., McGregor, P.K. & Dabelsteen, T. 2009. Effects of social environment and personality on communication in male Siamese fighting fish in an artificial network. ***Animal Behaviour****, 1-7, available online Nov.*
- Nachman, G. & Borregaard, M.K. (2010). From complex spatial dynamics to simple Markov chain models: Do predators and prey leave footprints? ***Ecography*** (in press)
- Nogués-Bravo, D., Araújo, M. B., Romdal, T. S. and Rahbek, C. (2008). Scale effects and human impact on the elevational species richness gradients. ***Nature*** 453: 216-220

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	11	1	12
Assist. Professor	0	1	1
Post-doc	0	10	10

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	40	3	43
Ph.D.	8	14	22

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation (Grundforskningsfonden): Centre for Social Evolution (2005-2015) and Center for Macroecology, Evolution and Climate (2010-2015)
Danish Natural Science Research Council (FNU): Rammebevillinger
EU Marie Curie Actions: Marie Curie Postdoctoral Fellowships

6. Three important collaborative research contracts/grants (Inter- & national)

LIFE, DTU, University of Bergen, University Paris 13 (Partners in two DNRF-Centers)
The Danish Raoad Directorate: Metapopulation simulation software development (Initial grant DKK 2,350,000)
Smithsonian Institution (National Museum of Natural History, DC and Tropical Research Institute, Panama)

Group:	Centre for Social Evolution
Department:	Biology
Group Leader:	Jacobus J. (Koos) Boomsma, Professor, 35 32 13 40, JJBoomsma@bio.ku.dk

1. Description of Research Field

The Centre for Social Evolution CSE) seeks to answer fundamental questions about the evolution, development and maintenance of complex biological systems. Social insects (ants, bees, wasps and termites) are the model organisms that we have chosen as main focus of our research, as they have spectacular societies with advanced division of labor, communication, food storage, collective decision-making and disease defense, waste management and agriculture.

2. Five newer representative publications

- Aanen, D.K., de Fine Licht, H.H., Debets, A.J.M., Kerstes, N.A.G., Hoekstra, R.F., and Boomsma, J.J. (2009). High Symbiont Relatedness Stabilizes Mutualistic Cooperation in Fungus-Growing Termites. ***Science*** 326(5956), 1103-1106.
- Boomsma, J.J. (2009). Lifetime monogamy and the evolution of eusociality. ***Philosophical Transactions of the Royal Society*** B 364(1533), 3191-3207.
- Fürst, M.A., and Nash, D.R. (In press). Host ant independent oviposition in the parasitic butterfly *Maculinea alcon*. ***Biology Letters.*** First cite DOI: 10.1098/rsbl.2009.0730
- Guerrieri, F.J., Nehring, V., Jørgensen, C.G., Nielsen, J., Galizia, C.G. and d'Ettorre, P. (2009). Ants recognize foes and not friends. ***Proceedings of the Royal Society*** B 276, 2461-2468.
- Vogel, V., Pedersen, J.S., d'Ettorre, P., Lehmann L., and Keller, L. (2009). Dynamics and genetic structure of Argentine ant supercolonies in their native range. ***Evolution*** 63, 1627-1639.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	3	0	3
Assist. Professor	0	0	0
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	5	0	5
Ph.D.	3	4	7

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
EU Marie Curie Programme
Carlsberg Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Faculty of Life Sciences, KU (Partner in DNRF CEntre); J. Eilenberg
Smithsonian Tropical Research Institute (STRI), Panama
Department of Ecology and Evolution, University of Lausanne; L. Keller

Group:	Animal Behaviour
Department:	Biology
Group Leader:	Torben Dabelsteen, Associate Professor, 35 32 13 05, tdabelsteen@bio.ku.dk

1. Description of Research Field

The group investigates animal social behavior and communication, with special focus on communication networks and related phenomena (e.g. information spread, eavesdropping, audience effects and cognition) using vertebrates as model organisms. We look at the adaptive value of communication behavior and its physiological correlates in contexts such as social organization and sexual selection. We also do research into animal stress and welfare in captivity.

2. Five newer representative publications

- Balsby, T.J.S. & Scarl, J.C. 2008. Sex-specific responses to vocal convergence and divergence of contact calls in orange-fronted conures (*Aratinga canicularis*). *Proc. R. Soc. B.* **275**, 2147-2154.
- Darden, S.K., Steffensen, L.K. & Dabelsteen, T. 2008. Information transfer among widely spaced individuals: Latrines as a basis for communication networks in the swift fox? *Anim. Behav.* **75**, 425-432.
- Bro-Jørgensen, J. & Dabelsteen, T. 2008. Knee-clicks and visual traits indicate fighting ability in eland antelopes: multiple messages and back-up signals. *BMC Biology.* **6-47**, 1-9.
- Matessi, G., Matos, J., Peake, T.M., McGregor, P.K. & Dabelsteen, T. 2009. Effects of social environment and personality on communication in male Siamese fighting fish in an artificial network. *Animal Behaviour, 1-7, available online Nov.*
- Hansen, B.K., Jeppesen, L.L. & Berg, P. 2009. Stereotupic behaviour in farm mink (*Neovison vison*) can be reduced by selection. *J. Anim. Breed. Genet.* **126**,1-10

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	1	1	2
Assist. Professor	0	1	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	13	0	13
Ph.D.	2	0	2

5. Three important external sources of income/grants (Funding bodies)

FNU, 1.326 kkr
Pelsdyrafgiftsfonden, 424 kkr
Ministry of Food, Agriculture and Fisheries, ("innovationsloven"), 1.181 kkr

6. Three important collaborative research contracts/grants (Inter- & national)

University of Aarhus, Foulum (Dr. P. Berg)
Exeter University (Dr. D. Croft & Dr. S.K. Darden)

Group:	Population Ecology
Department:	Biology
Group Leader:	Gösta Nachman, Associate Professor, 35 32 12 60, nachman@bio.ku.dk

1. Description of Research Field

The group focuses on evolutionary and demographic processes taking place at the population level. The goal is to describe, understand and predict changes in the genetic and demographic composition of populations. Studies focus on how individuals interact with conspecifics, mutualists, competitors, natural enemies, and the physical environment, and how these interactions shape populations in time and space. Work encompasses both experimental and theoretical approaches.

2. Five newer representative publications

- Nachman, G. & Borregaard, M.K. (2010). From complex spatial dynamics to simple Markov chain models: Do predators and prey leave footprints? *Ecography* (in press)
- Böcher, J.J. and Nachman, G. (2010). Are environmental factors responsible for geographic variation in the sex ratio of the Greenlandic seed-bug *Nysius groenlandicus*? *Entomologia Experimentalis et Applicata* (in press).
- Philipp, M., Jakobsen, R.B. Nachman, G. 2009: A comparison of pollen-siring ability and life history between males and hermaphrodites of subdioecious *Silene acaulis*. – *Evolutionary Ecology Research* 11: 787-801.
- Lindhardt, M.S., Philipp, M., Tye, A., Nielsen, L.R. 2009: Molecular, morphological, and experimental evidence for hybridization between threatened species of the Galapagos endemic genus *Scalesia* (Asteraceae). – International Journal of Plant Science 170: 1019-1030.
- Beatty, G.E., Philipp, M., Provan, J. 2009: Unidirectional hybridization at a species' range boundary: implications for habitat tracking. - *Diversity and Distributions*, published online.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	2	6
Ph.D.	1/3	1+2/3	2

5. Three important external sources of income/grants (Funding bodies)

Carlsberg Foundation DKK 200,000
Brødrene Hartmanns Foundation DKK 80,000
The Danish Road Directorate DKK 2,350,000

6. Three important collaborative research contracts/grants (Inter- & national)

University of Umeå, Sverige (Prof. Göran Englund)
Queen's University, Belfast, UK, (Dr. J. Provan)
Faculty of Life Sciences, DK, (Dr. Thure Hauser)

Group:	Biodiversity and Macroecology
Department:	Biology
Group Leader:	Carsten Rahbek, Professor, 35 32 10 30, crahbek@bio.ku.dk

1. Description of Research Field

Research focuses on assessing the diversity and distribution of life and life-forms on Earth and to explain patterns of biological diversity from first principle of evolution and ecology. Focus is on long-term (evolution and speciation) and short-term (succession and dynamics) spatio-temporal variation at scales of individual species, communities, landscapes and biogeographical units. Inductive and hypothesis-driven approaches are applied. Knowledge is related to environmental, biodiversity conservation, land-use and climate change issues.

2. Five newer representative publications

- Borregaard, M. K. and Rahbek, C. (in press). Causality of the relationship between geographic distribution and species abundance. ***The Quarterly Review of Biology***
- Graham, C. H., Parra, J. L., Rahbek C., and McGuire, J.A. (2009). Phylogenetic structure in tropical hummingbird communities. **Proceedings of the National Academy of Sciences, USA 106:** 19673-19678.
- Nogués-Bravo, D., Araújo, M. B., Romdal, T. S. and Rahbek, C. (2008). Scale effects and human impact on the elevational species richness gradients. ***Nature*** 453: 216-220
- Bruun, H.H., Lundgren, R. & Philipp, M. (2008) Enhancement of local species richness in tundra by seed dispersal through guts of muskox and barnacle goose. ***Oecologia*** 155: 101-110.
- Schmitt, C., Belokurov, A., Besançon, C., Boisrobert, L., Burgess, N.D., Campbell, A., Coad, L. Fish, L., Gliddon, D., Humphries, K., Kapos, V., Loucks, C., Lysenko, I., Miles, L., Mills, C., Minnemeyer, S., Pistorius, T., Ravilious, C., Winkel, G. (2009). Global Ecological Forest Classification and Forest Protected Area Gap Analysis. ***Biological Conservation*** 142: 2122–2130.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	1	2
Assoc. Professor	5	0	5
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	18	1	19
Ph.D.	4	7	11

5. Three important external sources of income/grants (Funding bodies)

The Danish National Research Foundtion Centre
The Danish Council for Independent Research (FNU)
US National Science Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

The Danish National Research Foundtion Centre for Macroecology, Evolution and Climate
US-NSF's National Evolutionary Synthesis Center program in "Mountaind diversity in space and time"
Spanish-NSF's program 'ANT-COMPLEX' (project on extramophiles lichens distribution and adaptation along an environmental gradient from Patagonia to Antarctic).

Section:	Freshwater Biology Section (FBS)
Department:	Biology
Section and Group Leader:	Section leader: Kirsten S. Christoffersen, Professor, 35 32 19 36, kchristoffersen@bio.ku.dk Group Leader: Kaj Sand Jensen, Full Professor, 35 32 19 05, ksandjensen@bio.ku.dk

1. Description of Research Field

The section conducts biological and ecological research in streams, lakes and coastal waters. The main purposes of our research are to understand and predict: 1) The influence of altered climate, land use, and utrophication on Ecosystem quality and transformation of carbon and nutrients, 2) The ecology and physiology of bacteria, plants, invertebrates and fish; and 3) The distribution of species, communities, and biodiversity from eco-physiological traits and environmental conditions.

2. Five newer representative publications

- Brodersen, K.P., O. Pedersen, C. Lindegaard & K. Hamburger 2004. Chironomids (Diptera) and oxyregulatory capacity: An experimental approach to paleolimnonolical interpretation. Limnology & Oceanography 49: 1549-1559.
- Borum, J., O. Pedersen et al. 2005. The potential role of plant oxygen and sulphide dynamics in die-off events of the tropical seagrass, *Thalassia testudinum.* Journal of Ecology 93: 148-158.
- Conan, P., M. Søndergaard, T. Kragh et al. 2007. Partitioning of organic production in marine phytoplankton communities: The effects of inorganic nutrient ratios and community composition in new dissolved organic matter. Limnology & Oceanography 52: 753-765.
- Jacobsen, D. 2008. Low oxygen pressure as a driving factor for the altitudinal decline in taxon richness of stream macroinvertebrates. Oecologia 154: 795-804.
- Sand-Jensen, K. & P. A. Staehr 2009. Net heterotrophy in small Danish lakes: A widespread feature over gradients in trophic status and land cover. Ecosystems 12: 336-348.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	6	0	6
Assist. Professor	0	0	0
Post-doc	1	2	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	11	0	11
Ph.D.	2,87	4,13	7

5. Three important external sources of income/grants (Funding bodies)

Villum Kann Rasmussen Foundation, Lake Center of Excellence
Danish Natural Science Research Council/ Danish Research Council for Strategic Research
Carlsberg Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Foreign universities: Western Australia, Perth; Radboud, Nijmegen, Holland; Maryland, USA; Florida, USA; Ecosystem Center, New York, USA; Wisconsin, Madison, USA.
ICES-SGPROD SNF, Biological Interactions in relation to landscape and climate millennia.
Danish and Scandinavian Universities: Odense, Roskilde, Aarhus, Aalborg, DTU, Lund, Tromsø, Helsinki.

Section/Group:	Marine Biology
Department:	Biology
SectionHead/Group Leader:	Section Head: Mathias Middelboe, Associate Professor 35 32 19 91, MMiddelboe@bio.ku.dk Group Leader: Michael Kühl, Professor, 35 32 19 56, mkuhl@bio.ku.dk

1. Description of Research Field

Our research covers two main research areas "*Marine Microbiology*" and *"Physiology and functional biology of marine organisms"*. These include the following topics 1) **Aquatic microbial ecology** (e.g. microenvironmental ecology and physiology, microbial diversity and interactions. **2) Functional Biology** (e.g. functional morphology and evolution of benthic invertebrates, adaptational and respiratory physiology, comparative physiology). 3) **Climate change** (e.g. ocean acidification, biogeochemistry in polar regions. 4) **Aquaculture and bioproducts** (e.g. Bacteriophage therapy, nutritional physiology).

2. Five newer representative publications

- **Fenchel T.** & Finlay B. Oxygen and the spatial structure of microbial communties. Biol. Rev. 83:553-569.
- Jensen L. D. E., Cao, R., Hedlund, E., Söll, I., Lundberg, J., Hauptmann, G., **Steffensen, J. F.** and Cao, Y. (2009). Nitric oxide permits hypoxia-induced lymphatic perfusion by controlling arterial-lymphatic conduits in zebrafish and glass catfish. Proc. Nat. Acad. Sciences. U.S.A. Vol 106, no 43; 18408-18413.
- **Middelboe, M.,** Holmfeldt, K. Riemann, L., Nybroe, O. and Haaber, J. (2009): Bacteriophages drive strain diversification in a marine Flavobacterium: Implications for phage resistance and physiological properties. Environ. Microbiol. 11(8):1971-1982.
- Tillmann U, **Hansen PJ** (2009). Allelopathic effects of the PSP producer Alexandrium on other algae: evidence from mixed growth experiments. Aquatic Microbial Ecology 57:101-112
- **Worsaae K** & Rouse GW (2009). The simplicity of males: Dwarf males of four species of Osedax (Siboglinidae; Annelida) investigated by confocal laser scanning microscopy. Journal of Morphology 271, online.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	5 (incl 1 on leave)	1	6
Assist. Professor	0	0	0
Post-doc	3	0	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12	5	17
Ph.D.	14	7	21

5. Three important external sources of income/grants (Funding bodies)

Danish Research Councils for Independent Research and Strategic Research (FNU)
Carlsberg Foundation
Danish National Advanced Research Council

6. Three important collaborative research contracts/grants (Inter- & national)

Danish universities ((DTU Aqua, Universities of Århus and Odense)
The Max Planck Institute of Marine Microbiology, Germany
US and Canadian Research Institutions

Section:	Evolution and Ecology of Aquatic Organisms
Department:	Biology
Section Leader	Niels Daugbjerg, Associate Professor, 35 32 23 19, n.daugbjerg@bio.ku.dk

1. Description of Research Field

Our section puts focus on understanding integrated aquatic organisms. We take a multidisciplinary approach combining molecular, structural, physiological and population level studies in an evolutionary and ecological perspective. The multidisciplinary approach is also reflected in our methodology ranging from advanced molecular methods over state of the art microscopy to field studies on both organismal and population levels.

2. Five newer representative publications

- Hansen, G. & Daugbjerg, N. 2009. *Symbiodinium natans* sp. nov. – a 'free-living' dinoflagellate from Tenerife (Northeast-Atlantic Ocean). Journal of Phycology 45: 251-263
- Sundström, A.M., Kremp, A., Daugbjerg, N., Moestrup, Ø., Ellegaard, M., Hansen, R. & Hajdu, S. 2009. *Gymnodinium corollarium* sp. nov. (Dinophyceae) - a new cold water dinoflagellate from the Baltic Sea: morphology, molecular phylogeny and ecophysiology. Journal of Phycology 45: 938-952.
- Bielecki J, Chan BKK, Hoeg JT, Sari A. 2009. Antennular sensory organs in cyprids of balanomorphan cirripedes: standardizing terminology using *Megabalanus rosa*. *Biofouling* 25: 203-214.
- Wanninger A. 2009. Shaping the things to come: Ontogeny of lophotrochozoan neuromuscular systems and the Tetraneuralia concept. *Invited review for the 4th Biological Bulletin Virtual Symposium Special Issue entitled "Biology of Marine Invertebrate Larvae". Biological Bulletin* 216: 293-306.
- Garm A, Anderson F, Nilsson, D-E (2008). Unique structure and optics of the lesser eyes of the box jellyfish *Tripedalia cystophora*. *Vision Research* 48: 1061-1073 (cover image)

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	1	5
Ph.D.	8	5	13

5. Three important external sources of income/grants (Funding bodies)

Danish Research Councils (Independent Research and Strategic)
Carlsberg Foundation
European Union

6. Three important collaborative research contracts/grants (Inter- & national)

European Union (Marie Curie Research Training Network "MOLMORPH" under the 6th Framework Programme. Partner Universities: Barcelona, Vienna, Berlin, Ulm.
EU Research Exchange Programme SYNTESYS.
IOC Science and Communication Center on Harmful Algae have formalized contacts with a number of international research centers and universities.

Group:	Plankton evolution and ecology
Department:	Biology
Group Leader:	Øjvind Moestrup, Professor, 35 32 22 90, moestrup@bio.ku.dk

1. Description of Research Field

Our research is centred on species diversity, molecular phylogenetics, evolutionary history, paleoecology of plankton (microalgae and protists) in marine and freshwater environments ranging from arctic to tropical regions. Studies are based on the use of light and electron microscopy (TEM and SEM) and molecular methods. Currently our research addresses the biology and ecology of dinoflagellates, diatoms, ciliates and nanoflagellates. We also focus on the taxonomy and toxicology of harmful microalgae.

2. Five newer representative publications

- Jensen, M.A. & Daugbjerg, N. 2009. Molecular phylogeny of selected species of the order Dinophysiales (Dinophyceae) - testing the hypothesis of a Dinophysioid radiation. Journal of Phycology 45: 1136-1152. Moestrup, Ø., Lindberg, K. & Daugbjerg, N. 2009. Studies on woloszynskioid dinoflagellates V. Ultrastructure of *Biecheleriopsis* gen. nov., based on investigations of *B. adriatica* (Lebour) comb. nov. (syn. *Gymnodinium pygmaeum* Lebour). Phycological Research 57: 221-237.
- Moestrup, Ø., Lindberg, K. & Daugbjerg, N. 2009. Studies on woloszynskioid dinoflagellates IV: the genus *Biecheleria* gen. nov. Phycological Research 57: 203-220.
- Tardio, M., Ellegaard, M., Lundholm, N., Sangiorgi, F., Di Giuseppe, G. 2009. A hypocystal archeopyle in a freshwater dinoflagellate from the *Peridinium umbonatum* group (Dinophyceae) from Lake Nero di Cornisello, South Eastern Alps, Italy. European Journal of Phycology 44: 241-250
- Garcia-Cuetos, L., Moestrup, Ø., Hansen, P.J. & Daugbjerg, N. 2010. The toxic dinoflagellate *Dinophysis acuminata* harbors permanent chloroplasts, not kleptochloroplasts. Harmful Algae 9: 25-38.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	0	2
Ph.D.	2	3	5

5. Three important external sources of income/grants (Funding bodies)

Danish Research Councils (Independent Research and Strategic)
Villum Kann Rasmussen Fonden
Carlsberg Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

IOC Science and Communication Center on Harmful Algae have formalized contacts with a number of international research centers and universities.
Other faculties and departments at University of Copenhagen, e.g. Faculty of Life Sciences and Geology/Geography, and with Danish universities, e.g. Aarhus University, National Environmental Research Institute (DMU).
University of Aveiro, Department of Biology, Portugal.

Group:	Comparative Zoology
Department:	Biology
Group Leader:	Andreas Wanninger, Associate Professor, 35 32 12 40, awanninger@bio.ku.dk

1. Description of Research Field

We study integrated aquatic animals in their environment. We take a broad comparative approach using organisms that can critically test evolutionary concepts as well as theories in reproductive biology and neurobiology. Present models span a range of phyla including mollusks, annelids, arthropods and cnidarians. The research tools comprise immunocytochemistry, advanced microscopy including confocal laserscanning microscopy, developmental genetics and gene expression analysis, PCR and neurophysiology.

2. Five newer representative publications

- Brinkmann N, Wanninger A. 2009. Neurogenesis suggests independent evolution of opercula in serpulid polychaetes. *BMC Evolutionary Biology* 9: 270.
- Garm A, Mori S. 2009. Multiple photoreceptor systems control the swim pacemaker activity in box jellyfish. *The Journal of Experimental Biology* 212: 3951-3960. (cover image).
- Perez-Losada M, Hoeg JT, Crandall KA. 2009. Convergent evolution in specialized parasitic Thecostraca (Crustacea). *BMC Biology* 7: 15.
- Kristof A, Wollesen T, Wanninger A. 2008. Segmental mode of neural patterning in Sipuncula. *Current Biology* 18: 1129-1132 (cover image).
- Nilsson D, Gislén L, Coates M, Skogh C, Garm A. 2005. Advanced optics in a jellyfish eye. *Nature* 435: 201-205 (cover image and News and Views paper).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	1	3
Ph.D.	4	5	9

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council / The Danish Agency for Science, Technology and Innovation
Carlsberg Foundation
European Union

6. Three important collaborative research contracts/grants (Inter- & national)

European Union (Marie Curie Research Training Network ”MOLMORPH” under the 6th Framework Programme, coordinated by Andreas Wanninger). Partner Universities: Barcelona, Vienna, Berlin, Ulm.
EU Research Exchange Programme SYNTHESYS.

2. DEPARTMENT OF CHEMISTRY

Groups:

- **Inorganic Chemistry – Catalysis and Magnetism**
- **Nano- and Materials Chemistry**
- **Biophysical Chemistry Group**
- **Scientific Computing in Chemistry**
- **Molecular Engineering Group**
- **APOC/CCAR**
- **NanoGeoScience**

Group:	Inorganic Chemistry – Catalysis and Magnetism
Department:	Chemistry
Group Leader:	Jesper Bendix, Professor, 35 32 01 01, Bendix@kiku.dk

1. Description of Research Field

The group works with activation of small molecules (N_2, CO_2, O_2, NO, CH_4, ...) at metal centers. Inspiration comes from bio-coordination chemistry, but also from a technical point of view. There is much interest in catalyzing processes involving these ubiquitous molecules. Use of robust transition metal complexes as protecting and directing groups in the synthesis of biologically relevant, multifunctional organic molecules is also part of the group's activities. The paradigms of magnetism have changed over the last years with the discovery that single molecules can be magnetized and exhibit quite large barriers towards relaxation of the magnetization. The group works on designing and synthesizing new molecule-based magnetic materials and on theoretical modeling of the electronic structure of these systems.

2. Five newer representative publications

- "Single-Ion Anisotropy and Exchange Interactions in the Cyano-Bridged Trimers (Mn_2M^{III})-M-$^{III}(CN)_6$ (M-III = Co, Cr, Fe): An Inelastic Neutron Scattering and Magnetic Susceptibility Study", Tregenna-Piggott PLW, Sheptyakov D, Keller L , Klokishner SI, Ostrovsky SM, Palii AV, Reu OS, Bendix J., Pedersen K, Weihe H, Mutka H. *Inorg. Chem.* 2009, *48*, 128-137.
- "A ligand-field study of the ground spin-state magnetic anisotropy in a family of hexanuclear Mn(III) single-molecule magnets." Piligkos, S.; Bendix, J.; Weihe, H.; Milios, C.J.; Brechin, E.K., Dalton Transactions, 2008, 17, 2277-2284.
- "Superhyperfine Interaction in $[MnF_6]^{3-}$" Scheifele, Q.; Birk, T.; Bendix,J.; Tregenna-Piggott, P. L. W.; Weihe, H. Angew. Chem. Int. Ed. 2008, 47, 148-150.
- "First aminoacetone chelate: [Co(tren){NH2CH2C(O)CH3}]3+—a substrate binding and activation model for zinc(II)-dependent 5-aminolaevulinic acid dehydratase. Gumm, A.; Hammershøi, A.; Kofod-Hansen, M.; Mønsted O.; Sørensen H. O. Dalton Transactions, 2007, 3227-3231.
- "Polarized X-ray Absorption Spectroscopy of Single-Crystal Mn(V) Complexes Relevant to the Oxygen-Evolving Complex of Photosystem II" Yano, J.; Robblee, J.; Pushkar, Y.; Marcus, M. A.; Bendix, J.; Workman, J. M.; Collins, T. J.; Solomon, E. I.; George, S. D.; Yachandra, V. K. J. Am. Chem. Soc. 2007 129(43), 12989-13000.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	1	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	0	4
Ph.D.	6	1	7

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (DNSRC)
ELTRA, Industry (especially Haldor Topsøe A/S)

6. Three important collaborative research contracts/grants (Inter- & national)

EPR spectrometer upgrade. 1.1 M DKK. with Nano and LIFE. (DNSRC).
Purchase of SQUID magnetometer 1.8 M DKK. with Nano (DNSRC).
The stability of dye sensitized Grätzel-type solar cells. 1.7 M DKK. with Techn. Inst. (ELTRA).

Group:	Nano- and Materials Chemistry
Department:	Chemistry
Group Leader:	Thomas Bjørnholm, Professor, 35 32 18 35, tb@nano.ku.dk

1. Description of Research Field

The overall aim of the nanochemistry research is to combine synthetic chemistry and supramolecular chemistry with new structural, optical and electronic nanotools, to reveal secrets of nanoscale assemblies. In particular we wish to develop our understanding of fundamental principles of chemical and biological self-organization as well as the intrinsic properties of new nanosystems with new chemical, biological, or physical properties. Key areas of interest are molecular electronics, bionanoscience and sensing.

2. Five newer representative publications

- Moth-Poulsen, K., Bjørnholm, T. Single-molecule electron transfer in solid state three-terminal devices: Status and challenges for molecular electronics with single molecules. *Nature Nanotechnology*, **4**, 551-556, 2009
- Tang, Q., Tong, Y., Hu, W., Qing, W., Bjørnholm, T. Assembly of nanoscale organic single-crystal cross-wire circuits, *Adv.Mat.* published online 12. Aug 2009 http://dx.doi.org/10.1002/adma.200901355
- Jain, T., Westerlund, F., Johnson, E., Moth-Poulsen, K., Bjørnholm, T. Self-Assembled Nanogaps via Seed-Mediated Growth of End-to-End Linked Gold Nanorods, *ACS NANO*, **3**, 828-834 (2009)
- Hansen, C., Sørensen, T.J., Glyvradal, M., Larsen, J., Eisenhardt, S., Bjørnholm, T., Nielsen, M., Feidenhans'l, R., Laursen, B. Structure of the Buried Metal-Molecule Interface in Organic Thin Film Devices. *Nano Letters* (Published on web Feb. 2009 - DOI: 10.1021/nl803393m)
- Moth-Poulsen, Kasper, Bendix, Jesper, Hammershøj, Peter, Bjørnholm, Thomas. Bis[S-6-(2,2:6 ',2 "-terpyridin-4 '-yloxy)hexylthioacetate]manganese(II) bis(hexafluorophosphate). Acta Crystallographica, Section C: Crystal Structure Communications 2009; vol. 65, Jan 2009. s. M14-M16.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	3	1	4
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	5	1	6
PhD	7	2	9

5. Three important external sources of income/grants (Funding bodies)

UNIK, Synthetic Biology, 2009-2013, Danish Ministry of Science, Technology and Innovation
European Union FP7: Single, 2008-2010
University of Copenhagen Excellence Program, 2008-2013

6. Three important collaborative research contracts/grants (Inter- & national)

See above

Group:	Biophysical Chemistry Group
Department:	Chemistry
Group Leader:	Leila Lo Leggio, Associate Professor, 35 32 02 95, leila@kemi.ku.dk

1. Description of Research Field

BCG works with a broad range of research projects mostly aimed at understanding chemical processes in living organisms. One area of focus is mathematical modeling of whole biochemical systems (systems biology). Another large part of the group's research involves the study of proteins, essential components in all living organisms and particularly the structure-function relationship of proteins of fundamental, biomedical and biotechnological interest. A new focus on Protein Design in collaboration with other groups at University of Copenhagen has recently developed.

2. Five newer representative publications

- Le Nours, J., De Maria, L., Welner, D., Jørgensen, C.T., Christensen, L.L.H., Borchert, T.V., Larsen, S. and Lo Leggio, L. (2009) Investigating the binding of β-1,4-galactan to *Bacillus licheniformis* β-1,4-galactanase by crystallography and computational modelling. *Proteins*, **75**, 977-989.
- Danø, S, Madsen, MF, Sørensen, PG (2007) Quantitative characterization of cell synchronization in yeast. *PNAS USA*, **104**, 12732-12736.
- Madsen AØ, Larsen S. (2007) Insight into solid-state entropy from diffraction data. *Ang.Chem.* **46**, 8609-13
- T.M. Greve, N. Rastrup Andersen, K. Birklund Andersen, M. Gniadecka, H.C. Wulf and O. Faurskov Nielsen (2007) "Biomedical aspects of water structure in human and animal skin", American Chemical Society, ACS Symposium Series: "New Approaches in Biomedical Spectroscopy" 963, 30-40.
- Mathias A. S. Hass, D. Flemming Hansen, Hans E. M. Christensen, Jens J. Led, and Lewis E. Kay (2008) Characterization of Conformational Exchange of a Histidine Side-chain: Protonation, Rotamerization and Tautomerization of His61 in Plastocyanin from Anabaena variabilis. *J. Am. Chem. Soc.*, **130**, 8460-8470.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4 (3 emeritus)	1	5
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	0	4
Ph.D.	8	0	8

5. Three important external sources of income/grants (Funding bodies)

Danish Strategic Research council
European Union
Danish Natural Science Research Council

6. Three important collaborative research contracts/grants (Inter- & national)

ESF research network: Functional Dynamics in Complex Chemical and Biological systems.
ERUDESP (FP7): Development of Electrochemical Reactors Using Dehydrogenases for Enantiopure Synthon Preparations.
University of Copenhagen Excellence Programme: Membrane topology and quaternary structure of key parasite proteins involved in *Plasmodium falciparum* malaria pathogenesis and immunity.

Group:	Scientific Computing in Chemistry
Department:	Chemistry
Group Leader:	Kurt V. Mikkelsen, Professor, 35 32 02 51, kmi@theory.ki.ku.dk

1. Description of Research Field

Theoretical and scientific computing methods form the basis for elucidating molecular understanding of biological, chemical and physical phenomena from micro over meso to macro scale. The future significance of our research field is covered by the following statement from the US department of Energy, 2003: ”The next 10 to 20 years will see computational science firmly embedded in the fabric of science - the most profound development in the scientific method in over three centuries”.

2. Five newer representative publications

- C.B Nielsen, S. Rettrup, S.P.A. Sauer, J. Chem. Phys. 2006, 124, Art. No. 114108. Two-photon absorption cross sections: An investigation of the accuracy of calculated absolute and relative values.
- L.L. Parker, A.R. Houk, J.H. Jensen, J. Am. Chem. Soc. 2006, 128, 9863. Cooperative hydrogen bonding effects are key determinants of backbone amide proton chemical shifts in proteins.
- A.B. Nadykto, A. Natsheh, F. Yu, K.V. Mikkelsen, J. Ruuskanen, Phys. Rev. Lett. 2006, 96, Art. No. 125701. Quantum nature of the sign preference in the ion-induced nucleation.
- J. Kongsted, K. Aidas, Kestutis, K. V. Mikkelsen, S. P. A. Sauer, J. Chem. Theo. Comp. 2008, 4, 267-277 On the accuracy of density functional theory to predict shifts in nuclear magnetic resonance shielding constants due to hydrogen bonding.
- S. Jorgensen, M. M.-L. Grage, G. Nyman, M. S. Johnson, Adv. Quant. Chem. 2008, 55, 101 Isotope effects in photodissociation: Chemical reaction dynamics and implications for atmospheres.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	3 (1 on leave)	1	4
Assist. Professor	0	1	1
Post-doc	0	5	5

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	8	0	8
Ph.D.	2	1	3

5. Three important external sources of income/grants (Funding bodies)

European Union
Danish Natural Science Research Council (DNSRC)
Danish Center for Scientific Computing (DCSC)

6. Three important collaborative research contracts/grants (Inter- & national)

Nanoquant and Molprop (EU projects)
CCAR (DNSRC center)

Group:	Molecular Engineering Group
Department:	Chemistry
Group Leader:	Mogens Brøndsted Nielsen, Professor, 35 32 02 10, mbn@kiku.dk

1. Description of Research Field

The overall aim is to understand the factors which control the reactivity and physico-chemical properties of macromolecules and via this knowledge to design and construct suitable synthetic macromolecules for mimicking and understanding Nature. Thus, we target functional molecules and supramolecular assemblies for artificial photosynthesis and catalysis as well as molecular sensors, switches and devices.

2. Five newer representative publications

- O. Hammerich, T. Hansen, A. Thorvildsen, J.B. Christensen, "Electrochemical One-Electron Oxidation of Low-Generation Polyamidoamine-Type Dendrimers with a 1,4-Phenylenediamine Core," ChemPhysChem **2009**, 10, 1805-1824.
- T.H. Fenger, J. Bjerre, M. Bols, "Cyclodextrin Aldehydes are Oxidase Mimics," *ChemBioChem* **2009**, *10*, 2494-2503.
- M.Å. Petersen, S.L. Broman, A. Kadziola, K. Kilså, M.B. Nielsen, "Dihydroazulene Photoswitches: The First Synthetic Protocol for Functionalizing the Seven-Membered Ring," *Eur. J. Org. Chem.* **2009**, 2733-2736.
- M. Pittelkow, C.B. Nielsen, A. Kadziola, J.B. Christensen, "Molecular recognition: minimizing the acid-base interaction of a tunable host-guest system changes the selectivity of binding," *J. Incl. Phenom. Macro.* **2009**, *63*, 257-266.
- D. Shanks, S. Preus, K. Qvortrup, T. Hassenkam, M.B. Nielsen, K. Kilså, "Excitation energy transfer in novel acetylenic perylene diimide scaffolds," *New. J. Chem.* **2009**, *33*, 507-516.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	4½	0	4½
Assist. Professor	0	1	1
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	20	2	22
Ph.D.	19	0	19

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
Carlsberg Foundation
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

EU-SINGLE
Project with ETH-Zürich
Projects with Novo Nordisk and Coloplast

Group	APOC/CCAR
Department:	Chemistry
Group Leader:	Ole John Nielsen, Professor, 35 38 63 18, ojn@kiku.dk

1. Description of Research Field

The group carries out fundamental research in gas-phase chemistry and the chemistry at interfaces, often inspired by environmental issues or by problems in atmospheric chemistry. The approach is predominantly experimental and concerns the properties of atmospheric aerosols, the properties and reactions of new molecules, radicals, clusters and ions in the gas phase and isotope effects on chemical reactions. Our approach draws heavily on thermodynamics, spectroscopy, reaction kinetics and mechanism, photochemistry, physical and physical organic chemistry and applied quantum chemistry.

2. Five newer representative publications

- 1. Hammerum S: Alkyl Radicals as Hydrogen Bond Acceptors: Computational Evidence JOURNAL OF THE AMERICAN CHEMICAL SOCIETY Volume: 131 Pages: 8627-8635
- 2. Andersen VF, Nilsson EJK, Jorgensen S, Nielsen, OJ, Johnson MS: Methyl acetate reaction with OH and Cl: Reaction rates and products for a biodiesel analogue, CHEMICAL PHYSICS LETTERS Volume: 472 Pages: 23-29
- 3. Ueno Y, Johnson MS, Danielache SO, Eskebjerg C, Pandey A , Yoshida N: Geological sulfur isotopes indicate elevated OCS in the Archean atmosphere, solving faint young sun paradox PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA Volume: 106 Pages: 14784-14789
- 4. Rusteika N, Brogaard RY, Solling TI, Rudakov FM^2, Webert PM: Excited-State Ions in Femtosecond Time-Resolved Mass Spectrometry: An Investigation of Highly Excited Chloroamines JOURNAL OF PHYSICAL CHEMISTRY A Volume: 113 Pages: 40-43
- 5. von Hessberg C, von Hessberg P, Poschl U, Bilde M, Nielsen OJ, Moortgat GK: Temperature and humidity dependence of secondary organic aerosol yield from the ozonolysis of beta-pinene:ATMOSPHERIC CHEMISTRY AND PHYSICS Volume: 9 Pages: 3583-3599

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	4	0	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	14	0	14
Ph.D.	4	7	11

5. Three important external sources of income/grants (Funding bodies)

The Danish Natural Science Research Council (DNSRC)
European Commission
Villum Kahn Rasmussen Foundation (VKRF)

6. Three important collaborative research contracts/grants (Inter- & national)

Villum Kahn Rasmussen Foundation: Biofuels, 5 MDKK (2009-2011)
Molecular Movies (Center of Excellence)
EU (Intramif, EUROCHAMO and CBACCI)
Most important formal industrial collaborations: Ford Motor Company, 3M, Dupont, Honeywell

Group:	NanoGeoScience
Department:	Chemistry
Group Leader:	Susan S.L. Stipp, Professor, 28 75 02 02, stipp@nano.ku.dk

1. Description of Research Field

The NanoGeoScience team consists of chemists, physicists, mineralogists, biologists, geologists and engineers with experience in applying nano techniques in goal-oriented research, for solving problems for industry and society on topics of energy and the environment: Clean water, safer storage of waste, biomineralisation, more oil from spent reservoirs and immobilization of CO2 in rock form. Our expertise and facilities, optimised for natural materials, are unique in the world.

2. Five newer representative publications

- Hassenkam T, Skovbjerg L.L., Stipp S.L.S. (2009) Probing the intrinsically oil-wet surfaces of pores in North Sea chalk at subpore resolution. *Proc. Na. Acad. Sci. USA (PNAS)* **106,** 6071-6076.
- Yang M., Rodger P.M., Harding J. and Stipp S.L.S. (2009) Molecular dynamics simulations of peptides on calcite surface *Molecular Simulation,* **2009**, 1-7.
- Christiansen B.C., Balic-Zunic T., Petit P.O., Frandsen C., Mørup S., Geckeis H., Katerinopoulou A. and Stipp S.L.S. (2009) Synthesis and characterisation of an iron-bearing layered double hydroxide (LDH) – Green rust sodium sulphate. *Geochimica et Cosmochimica Acta,* **73,** 3579-3572.
- Christiansen B.C., Balic-Zunic T., Dideriksen K and Stipp S.L.S. (2009) Identification of Green Rust in Groundwater *Environmental Science and Technology,* ***43,*** 3436-3441.
- Henriksen K. and Stipp S.L.S. (2009) Controlling biomineralisation: The effect of solution composition on coccolith polysaccharide functionality. *Crystal Growth and Design,* **9(5)** 2088-2097.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	1	1
Assoc. Professor	0	0	0
Assist. Professor	0	0	0
Post-doc	0	6	6

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	3	1	4
Ph.D.	10	3	13

5. Three important external sources of income/grants (Funding bodies)

Danish National Advanced Technology Foundation: *NanoChalk*
BP, ExploRe Programme: *NanoSand*
EU: Marie Curie Stipends and Early Training Networks

6. Three important collaborative research contracts/grants (Inter- & national)

NanoSand (see above) is a collaboration between BP, KU, Uni Twente, and Max Planck Institute (Göttingen).
The Mineral Nucleation and Growth Kinetics (MIN-GRO) Research and Training Network combines the expertise of eight universities (Copenhagen, Leeds, London, Muenster, Oslo, Oviedo, Reykjavik and Toulouse) and one industrial partner (Statoil).
The Mineral-fluid Interface Reactivity Early Stage Training Network (MIR-EST) is comprised of five universities located in Germany, France, Spain, Denmark and the United Kingdom.

3. DEPARTMENT OF COMPUTER SCIENCE

Groups:

- **Human-Centered Computing (HCC)**
- **Algorithms and Programming Languages (APL)**
- **Image Group**

Group:	Human-Centered Computing (HCC)
Department:	Computer Science
Group Leader:	Erik Frøkjær, Associate Professor, 35 32 14 56, erikf@diku.dk

1. Description of Research Field

The group studies the design, use and deployment of IT tools and computer-based information systems, both in people's everyday life and in organizations. A central focus is design and evaluation studies of the interaction between people, organizations and IT tools for complex tasks. The endeavor is to explore important theoretical assumptions, or to challenge common beliefs, in order to reach more coherent and valid insights, or to indicate new possibilities for useful IT. A key ingredient is evaluation of user interfaces by prototype development and emphasis on rigorous experimental evaluation thereof.

2. Five newer representative publications

- Bansler, J.P. & E. Havn (2006) Sensemaking in technology-use mediation: Adapting groupware technology in organizations. Computer Supported Cooperative Work, Vol. 15, pp. 55-91.
- Frøkjær, E. and Hornbæk, K. (2008) Metaphors of human thinking for usability inspection and design. ACM Trans. Comput.-Hum. Interact., Vol.14, No. 4, 33 pages.
- Hornbæk, K. & Frøkjær, E. (2008) A Study of the Evaluator Effect in Usability Testing. Human-Computer Interaction, Vol. 23, No. 3, pp. 1–27.
- Jakobsen, M. R. and Hornbæk, K. (2009) Fisheyes in the field: using method triangulation to study the adoption and use of a source code visualization. Proceedings of ACM CHI '09, pp. 1579–1588.
- Simonsen, J.G. & Houen, S. & Hedegaard, S. (2009). LAIR: A language for automated semantics-aware text sanitization based on frame semantics. Proceedings of IEEE ICSC '09, pp. 47–52

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	1	0	1
Assist. Professor	1	0	1
Post-doc	1	0	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	11	0	11
Ph.D.	6	1	7

5. Three important external sources of income/grants (Funding bodies)

Danish Research Agency, NaBiIT
Danish Research Agency, FNU
European Union, COST Programme, Action 294. MAUSE project.

6. Three important collaborative research contracts/grants (Inter- & national)

USE – Usability Evaluation and Software Design: Bridging the Gap (with the University of Aalborg)
MAUSE – Towards Maturation of Information Technology Usability Evaluation. Network of Excellence (19 academic partners at European universities; project headed by ETH Zürich)
CITH – Co-constructing IT and Healthcare (with 4 domestic academic partners, including the Copenhagen University Hospital)

Group:	Algorithms and Programming Languages (APL)
Department:	Computer Science
Group Leader:	Fritz Henglein, Professor, 35 32 14 63, henglein@diku.dk

1. Description of Research Field

- Foundations of computing, incl. computability, complexity, logic, type theory
- Semantics-based programming language design and implementation, incl. program analysis, transformation, and verification
- Efficient data structures and algorithms, specifically for computational biology and network optimization problems
- Generic frameworks for algorithmically and practically safe and efficient programming
- Domain-specific languages, with applications to operating systems, enterprise systems, eHealth systems, internet games, etc.

2. Four newer representative publications

- J Brunel, D Doligez, R Hansen, J Lawall, G Muller, A foundation for flow-based program matching using temporal logic and model checking, ACM Principles of Programming Languages, 2009
- R Glück, An investigation of Jones optimality and BTI-universal specializers, Higher-Order Symbolic Computation 21:3, 2008
- F Henglein, What is a Sorting Function?, J. Logic and Algebraic Programming, 2009
- J Katajainen, Multipartite priority queues, ACM Transactions on Algorithms 5:1, 2008

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1 (MSO)	0	1
Assoc. Professor	7	0	7
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12	0	12
Ph.D.	4	7	11

5. Three important external sources of income/grants (Funding bodies)
Danish National Advanced Technology Foundation (Højteknologifonden)
Danish research councils, specifically FNU, FTP
Industrial (Microsoft Development Center Copenhagen)

6. Three important collaborative research contracts/grants (Inter- & national)
Improving the Security of Infrastructure Software (ISIS): DIKU-INRIA
3d generation enterprise resource planning systems (3gERP): CBS-DIKU-Microsoft
Low-power reversible microcomputers (MicroPower): DIKU-U. Gent-Oticon

Group:	Image Group
Department:	Computer Science
Group Leader:	Mads Nielsen, Professor, 28 75 14 50, madsn@diku.dk

1. Description of Research Field

The group performs theoretical and experimental research in image analysis, computer graphics and high performance computing and their applications to hard sciences. Methodologies currently employed are among others machine learning, grid computing, variational methods, computer vision and scale space.

2. Five newer representative publications

- Nielsen, Mads ; Raundahl, Jakob ; Pettersen, Paola ; Loog, Marco ; Karemore, Gopal Raghunath ; Karsdal, Morten ; Christiansen, Claus. Low dose transdermal estradiol induces breast density and heterogeneity changes comparable to those of raloxifene. *Menopause*. 2009
- Søren Hauberg, Jerome Lapuyade, Morten Engell-Nørregård, Kenny Erleben, and Kim Steenstrup Pedersen. Three dimensional monocular human motion analysis in end-effector space. In Daniel Cremers et al., editors, Energy Minimization Methods in Computer Vision and Pattern Recognition, Lecture Notes in Computer Science, pages 235-248. Springer, August 2009.
- L. Sørensen, Pechin Lo, H. Ashraf, J. Sporring, M. Nielsen, and M. de Bruijne, "Learning COPD sensitive filters in pulmonary CT," in Medical Image Computing & Computer-Assisted Intervention, D. Hawkes, D. Rueckert, and G. Yang, eds., Lecture Notes in Computer Science, Springer, 2009.
- B. Vinter et al., Towards a Robust and Reliable Grid Middleware. Grid Technology and Applications: Recent Developments. Nova Science Publishers, Inc., 2009.
- S. Sommer, A. Tatu, C. Chen, M. Loog, M. de Bruijne, D. Jørgensen, M. Nielsen and F. Lauze: *Bicycle Chain Shape Manifolds,* Proceedings of MMBIA 2009, to appear.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	5	1	6
Assist. Professor	0	2	2
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	25	0	25
Ph.D.	21	1	22

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council, Danish Research Council for Technology and Production Science, Programme Commission on Strategic Growth Technologies; Corporate Funding; European Union, People Programme

6. Three important collaborative research contracts/grants (Inter- & national)

COPD CT Image Analysis (DIKU, AstraZeneca, Danish Lung Cancer Society); Learning Imaging Biomarkers (DIKU, Nordic Bioscience, Danish Research Foundation); High Performance High Productivity Tools for Industrial Image Analysis (DIKU, Danish Meat Research Institute)

4. DEPARTMENT OF EXERCISE AND SPORT SCIENCES

Groups:

- **Integrated Physiology – Cardiovascular, Metabolism and Ionic-transport**
- **Sport, politics and welfare**
- **Motor control and biomechanics**
- **Molecular Physiology – Metabolism, Nutrition and Health**
- **Body, learning & identity**

Group:	**Integrated Physiology – Cardiovascular, Metabolism and Ionic-transport**
Department:	Exercise and Sport Sciences
Group Leader:	Jens Bangsbo, Professor, 35 32 16 23, jbangsbo@ifi.ku.dk

1. Description of Research Field

The research field covers the regulation of muscle blood flow, metabolism and ion transport during exercise. By use of models from molecules to man the complex interplay between the various systems are studied. In addition, a significant amount of research is related to how the various organ systems are playing together and what causes fatigue during various types of exercise. A specific focus is on health issues and on performance, testing and training in elite sports.

2. Five newer representative publications

- Hellsten Y., Krustrup P., Iaia M., Secher N.H., & Bangsbo J. (2009). Partial neuromuscular blockade in humans enhances muscle blood flow during exercise independently of muscle oxygen uptake and acetylcholine receptor blockade. Am. J. Physiol., 296: R106-1112.
- Krustrup P., Nielsen J.J., Krustrup B.R. Christensen J.F. Pedersen H., Randers M, Aagaard P., Petersen A., Nybo L. & Bangsbo J. (2009). Recreational soccer is an effective health-promoting activity for untrained men. Br J Sports Med., 43: 825-831.
- Krustrup P., Jones A.M., Wilkerson D.P., Calbet J.A. & Bangsbo J. (2009). Muscular and pulmonary O2 uptake kinetics during moderate and high-intensity sub-maximal knee-extensor exercise in humans. J. Physiol, 587: 1843-1856.
- Mortensen S., Nyberg M., Thaning P., Saltin B. & Hellsten Y. (2009). Adenosine contributes to blood flow regulation in the exercising human leg by increasing nitric oxide and prostaglandin formation. Hypertension 53(6):993-999.
- Nordsborg N.B., Kusuhara K., Hellsten Y., Lyngby S., Lundby C., Madsen K. & Pilegaard H. (2009). Contraction induced changes in skeletal muscle Na(+), K(+) pump mRNA expression - importance of exercise intensity and Ca(2+) mediated signalling. Acta Physiol (Oxf). Nov 6.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	1	0	1
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	14	2	16
Ph.D.	2	4	6

5. Three important external sources of income/grants (Funding bodies)

Danish Medical Research Council
Novo Nordisk Foundation
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Different sources “Barrierer for fysisk aktivitet”
FIFA
EU

Group:	Sport, politics and welfare
Department:	Exercise and Sport Sciences
Group Leader:	Hans Bonde, Professor, 35 32 08 62, Hbonde@ifi.ku.dk

1. Description of Research Field

Main issues of this research group are: Sport structures, policies, national identities, ideologies and practices from a historical and sociological perspective including sport engagement and physical activities of the population (various groups, among others children, various contexts), health discourses and the potential of physical activities in the areas of prevention and rehabilitation of "life style" diseases, sport, gender and ethnicities, sport organization, volunteering and leadership, physical activities in the welfare state & doping discourses.

2. Five newer representative publications

- Agergaard, Sine & Sørensen, Jan Kahr: 'The dream of social mobility: ethnic minority players in Danish football clubs.' Soccer and Society. 10 (6): 766-780. 2009
- Bonde, Hans: International Journal of the History of Sport, Volume 26 Issue 10 2009: Masculinity, Sport, Politics – Nationalism, Regionalism, Globalization: The World, Europe and Danish Association and Disassociation (all 15 research articles, 265 pages, by same author)
- Ottesen, Laila; Thing, Lone Friis, in: Sport, Sundhed og Identitet, Copenhagen: Frydenlund, 2009. p. 11-27 (Sport & Sundhed).
- Pfister, Gertrud; Radtke, Sabine: Sport, women, and leadership: Results of a project on executives in German sports organizations, in: European Journal of Sport Science. 2009; vol. 9, nr. 4, s. 229-243.
- Jørgensen, Kurt; Trangbæk, Else. in: Forskning i Bevægelse: Et nyt forskningsfelt i et 100-årigt perspektiv. Eds.: Anne Lykke Poulsen; Else Trangbæk; Kurt Jørgensen; Nikolai Nordsborg. København: Museum Tusculanums Forlag, 2009. p. 280-286.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	3	0	3
Assist. Professor	1	0	1
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12	0	12
Ph.D.	1	7	8

5. Three important external sources of income/grants (Funding bodies)

The Danish National Council for Research and Innovation
UNIK project, 1.7 million D.kr. from the Danish Ministry of Science.
Danish Program Commission on Food and Health, 5 million D.kr.

6. Three important collaborative research contracts/grants (Inter- & national)

DGI, Team Denmark, Anti Doping Denmark are cooperation partners for the research group in a doping project
Research group 'Gender and Doping', Charlene Weavers (St. Francis Xavier University, Nova Scotia), Sara Teetzel and Angela Schneider (The University of Western Ontario, Ontario), WADA

Group:	Motor control and biomechanics
Department:	Exercise and Sport Sciences
Group Leader:	Jens Bo Nielsen, Professor, 35 32 74 50, jbnielsen@ifi.ku.dk

1. Description of Research Field

The main research focus of the group is to understand how movement is generated, controlled and optimized by training through an interaction between brain, spinal cord, muscles and sensory feedback. In addition, applied research is conducted in relation to sports training, rehabilitation following nervous system lesions and work-related disorders of the musculo-skeletal system.

2. Five newer representative publications

- Bandholm T, Rose MH, Sløk R, Sonne-Holm S, Jensen BR. Ankle torque steadiness is related to muscle activation variability and coactivation in children with cerebral palsy. Muscle Nerve. 2009, 40(3):402-10.
- Bandholm T, Magnusson P, Jensen BR, Sonne-Holm S. Dorsiflexor muscle-group thickness in children with cerebral palsy: Relation to cross-sectional area. NeuroRehabilitation. 2009;24(4):299-306
- Wienecke J, Westerdahl AC, Hultborn H, Kiehn O, Ryge J. Global gene expression analysis of rodent motor neurons following spinal cord injury associate molecular mechanisms with development of post-injury spasticity. J Neurophysiol. 2009 Nov 25
- Petersen TH, Rosenberg K, Petersen NC, Nielsen JB. Cortical involvement in anticipatory postural reactions in man. Exp Brain Res. 2009 Feb;193(2):161-71.
- Klint R, Nielsen JB, Sinkjaer T, Grey MJ. Sudden drop in ground support produces force-related unload response in human overground walking. J Neurophysiol. 2009 Apr;101(4):1705-12

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	3	2	5
Assist. Professor	1	0	1
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12	1	13
Ph.D.	2 1/3	4 2/3	7

5. Three important external sources of income/grants (Funding bodies)

Research Council for Health and Disease
Elsass foundation
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Center for Research in Spasticity and Neurorehabilitation (national collaboration headed by Jens Bo Nielsen, including 6 different research groups in Copenhagen, Aarhus and Aalborg. Total funding: 22 MDKK).
Center for Neuroengineering (national collaboration including Risoe, Danish Technical University, Aarhus and Aalborg university; total funding: 12 MDKK).
Collaboration with Monica Perez, Pittsburg University (NIH, total funding 900,000 $).

Group:	Molecular Physiology – Metabolism, Nutrition and Health
Department:	Exercise and Sport Sciences
Group Leader:	Erik A. Richter, Professor, 28 75 16 26, erichter@ifi.ku.dk

1. Description of Research Field

Understanding the complex processes in the body that regulate energy metabolism, molecular signalling, vascular perfusion and gene expression in muscle in relation to physical activity and health. We study these processes from the molecular level to intact human organisms to obtain an understanding of the integrated physiology of the human body with focus on muscle, exercise and metabolism, in particular insulin action in health and disease (type 2 Diabetes).

2. Five newer representative publications

- Rose AJ, Jeppesen J, Kiens B and Richter EA. Effects of contraction on localization of GLUT4 and v-SNARE isoforms in rat skeletal muscle. Am J Physiol Regul Integr Comp Physiol 297: R1228-R1237, 2009.
- Pehmoller C, Treebak JT, Birk JB, Chen S, Mackintosh C, Hardie DG, Richter EA and Wojtaszewski JF. Genetic disruption of AMPK signaling abolishes both contraction- and insulin-stimulated TBC1D1 phosphorylation and 14-3-3 binding in mouse skeletal muscle. Am J Physiol Endocrinol Metab 297: E665-E675, 2009.
- Treebak JT, Frosig C, Pehmoller C, Chen S, Maarbjerg SJ, Brandt N, Mackintosh C, Zierath JR, Hardie DG, Kiens B, Richter EA, Pilegaard H and Wojtaszewski JF. Potential role of TBC1D4 in enhanced post-exercise insulin action in human skeletal muscle. Diabetologia 52: 891-900, 2009.
- Frosig C, Roepstorff C, Brandt N, Maarbjerg SJ, Birk JB, Wojtaszewski JF, Richter EA and Kiens B. Reduced malonyl-CoA content in recovery from exercise correlates with improved insulin-stimulated glucose uptake in human skeletal muscle. Am J Physiol Endocrinol Metab 296: E787-E795, 2009.
- Alsted TJ, Nybo L, Schweiger M, Fledelius C, Jacobsen P, Zimmermann R, Zechner R and Kiens B. Adipose triglyceride lipase in human skeletal muscle is upregulated by exercise training. Am J Physiol Endocrinol Metab 296: E445-E453, 2009.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1+2 with special duties	0	3
Assoc. Professor	0	0	0
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	10	2	12
Ph.D.	7	2	9

5. Three important external sources of income/grants (Funding bodies)

Danish Medical Research Council
Novo Nordisk Foundation
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

European Union FP6: Integrated project EXGENESIS (94 MDKK for 25 partners over five years)
Danish Council for Strategic Research (12.5 MDKK over four years for our group)
UNIK Food Fitness & Pharma

Group:	Body, learning & identity
Department:	Sport and Exercise Sciences
Group Leader:	Reinhard Stelter, Professor, 35 32 08 66, rstelter@ifi.ku.dk

1. Description of Research Field

Physical/bodily activities contribute to developing identity and have an influence on learning in the sense of processes going on within social practice. Among other things, the research is centred on: learning and identity processes within sport with focus on the body as the pivotal point for aesthetic learning processes; movement and sport as social practice communities; the interaction between body, experience and identity; motivational processes, coaching and mindfulness.

2. Five newer representative publications

- Stelter, R. (2009). Experiencing mindfulness meditation - a client narrative perspective. *International Journal of Qualitative Studies on Health and Well-Being,* 4(3), 145-158. DOI: *10.1080/*17482620903013908
- Wylleman, P., Harwood, C., Elbe, A.-M., Reints, A., & De Caluwé, D. (2009). A Perspective on education and professional development in applied sport psychology. *Psychology of Sport and Exercise*, 10(4), 435-446.
- Engel, L., & Winther, H. D. (2009). Tæt på kroppen i nutidens og fremtidens idrætsforskning. In A.L. Poulsen, E. Trangbæk, K. Jørgensen & N. Nordsborg (Eds.), *Forskning i Bevægelse: Et nyt forskningsfelt i et 100-årigt perspektiv* (pp. 332-345). København: Museum Tusculanums Forlag.
- Bentsen, P. B., Mygind, E., & Randrup, T. B. (2009). Towards an understanding of udeskole: Education outside the classroom in a Danish context. *Education 3-13,* 37(1), 29-44. DOI: 10.1080/03004270802291780
- Svendler Nielsen, C. (2009). Bevidsthed i bevægelse: om børns kropslige oplevelser og læringsmuligheder i dans og idræt i skolen. In K. Fink-Jensen & A. M. Nielsen (Eds.), *Æstetiske Læreprocesser: i teori og praksis*. (pp. 125-141). Værløse, Denmark: Billesø & Baltzer.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1 (MSO)	0	1
Assoc. Professor	2	0	2
Assist. Professor	5 (teaching positions)	0	5
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	19	0	19
Ph.D.	1	3	4

5. Three important external sources of income/grants (Funding bodies)

The Danish Outdoor Council (Friluftsrådet)
Team Danmark

6. Three important collaborative research contracts/grants (Inter- & national)

Faculty of Life Sciences
The Institute of Coaching, Harvard Medical School

5. DEPARTMENT OF GEOGRAPHY AND GEOLOGY

Groups:

- **Terrestrial Ecosystem Analysis**
- **Water Resources**
- **Geochemical, Mineralogical and Petrographical Earth Processes**
- **Transformation of Cities and Landscapes**
- **Geomorphology, Processes and Landscapes**
- **Environment and Society in Developing Countries**
- **Basin Studies Group**
- **Geologically Applied Geophysics**

Group:	Terrestrial Ecosystem Analysis
Department:	Geography and Geology
Group Leader:	Bo Elberling, Professor, 35 32 25 20, be@geo.ku.dk

1. Description of Research Field
Research focuses on interactions between climate, soil, water and humans in order to quantify the dynamics of changes in element pools and fluxes, soil formation and landscape forms. Research includes both natural and anthropogenic systems and across latitudes; primarily in cold and temperate climates.

2. Five newer representative publications

- **Breuning-Madsen**, H., **Elberling, B, Balstrøm, T**., Holst, M. & Freudenberg, M. (2009) A comparison of soil organic carbon stock in ancient and modern land use systems in Denmark. European Journal of Soil Sciences 60, 55–63.
- **Jørgensen, C.J.**, Jacobsen, O.S., **Elberling, B** & Aamand, J. (2009) Microbial oxidation of pyrite coupled to nitrate reduction in anoxic groundwater sediment. Environmental Science Technology 43, 4851–4857.
- Post, E. (et al.), Forchhammer, M.C., Bret-Harte, S., Callaghan, T.V., Christensen, T.R., **Elberling, B.** (2009). Ecological dynamics across the Arctic associated with recent climate change. Science 325, 1355-1358.
- **Hollesen J., Elberling, B. & Hansen, B.U.** (2009). Modelling subsurface temperatures in a heat- producing coal waste rock pile, Svalbard (78˚N). Cold Regions Science and Technology 58, 68-76.
- Mernild, S.H., Kane, D.L., **Hansen, B.U.**, **Jakobsen, B.H.**, Hasholt, B. & Knudsen, N.T. (2008): Climate, glacier mass Balance and runoff (1993-2005) Mittivakkat Glacier catchment, Ammassalik island SE Greenland, and in a long term perspective (1898-1993). Hydrology Research 39(4): 239-256.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	6	1	7
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	5	2	7
Ph.D.	7	2	9

5. Three important external sources of income/grants (Funding bodies)
Danish Natural Science Research Council (DNSRC)
Danish Environmental Protection Agency
Norden - Nordic Council of Ministers

6. Three important collaborative research contracts/grants (Inter- & national)
NECC- Nordic Centre for Studies of Ecosystem Carbon Exchange and its Interactions with the Climate System - [2001-2008]
Zackenberg Basic- Environmental Monitoring in a High Arctic Ecosystem & Nuuk Basic - Environmental Monitoring in a Low Arctic Ecosystem [Danish Environmental Protection Agency, 2007-2009]
Natural Spatial Subsidies in Continental Antarctic Soils.- [New Zealand Antarctica Research 2005-2008].

Group:	Water Resources
Department:	Geography and Geology
Group Leader:	Peter Engesgaard, Assoc. Professor, 35 32 24 64, pe@geo.ku.dk

1. Description of Research Field

The research field focuses on the advancement of techniques for monitoring, studying, and understanding processes that govern fluxes of water and matter across hydrological domains; land surface, vadose zone, groundwater, and water bodies such as streams, lakes, and oceans. The objectives are to improve our understanding of small- and large scale hydrological processes enabling us to better establish water balances for catchments and to design a sustainable use of the water resources; now and in a changing climate.

2. Five newer representative publications

- Cordua KS, Nielsen L, Looms M.C., et al., (2009), Quantifying the influence of static-like errors in least-squares-based inversion and sequential simulation of cross-borehole ground penetrating radar data, J. Appl. Geophys., 68, 71-84.
- van Roosmalen L., Sonnenborg T.O., Jensen K.H., (2009), Impact of climate and land use change on the hydrology of a large-scale agricultural catchment, Water Resour. Res., 45, Article Number: W00A15.
- Vithanage, M., K. Villholth, K. Mahatantila, P. Engesgaard, and K.H. Jensen, (2009), Effect of well cleaning and pumping on groundwater quality of a tsunami affected coastal aquifer in eastern Sri Lanka, 45, Water Resour. Res., W07501, doi:10.1029/2008WR007509.
- Scharling, P., E.S. Rasmussen, T.O. Sonnenborg, P. Engesgaard, K. Hinsby, (2009), 3D regional scale hydrostratigraphical modeling based on sequence stratigraphical methods, DOI 10.1007/s10040-009-0475-6.
- Rosenbom A.E., Therrien R., Refsgaard J.C., K.H. Jensen, (2009), Numerical analysis of water and solute transport in variably-saturated fractured clayey till, J. Contam. Hydrol., 104, 137-152.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	1	0	1
Assist. Professor	0	1	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	5	0	5
Ph.D.	9	3	12

5. Three important external sources of income/grants (Funding bodies)

Villum Kann Rasmussen Centre of Excellence (2 projects)
European Union (1 project)
Danish Natural Science Research Council (1 project)

6. Three important collaborative research contracts/grants (Inter- & national)

HOBE (National, 2007-2012, Villum Kann Rasmussen Centre of Excellence 6 partners, PI :IGG)
CLEAR (National, 2006-2011, Villum Kann Rasmussen Centre of Excellence 5 partners, PI :SDU)
AQUAREHAB (International, 2009-2012, EU-FP7; 19 partners, PI: VITO/Belgium)

Group:	Geochemical, Mineralogical and Petrographical Earth Processes
Department:	Geography and Geology
Group Leader:	Robert Frei, Professor, 35 32 24 50, robertf@geo.ku.dk

1. Description of Research Field

The discipline "Geochemistry, Mineralogy and Petrology" comprises a large field of research with interdisciplinary branches that range from igneous, volcanic, metamorphic and sedimentary geology to geobiological applications addressing recent as well as ancient processes of the Earth System. In addition, the topical field is extended by research on crystal and modulated structures, crystal chemistry of minerals under high pressure and temperature conditions, technological materials, and the study of synthetic phase systems.

2. Five newer representative publications

- **Frei, R.**, Gaucher, C., Poulton, S.W. and Canfield, D.E (2009) Fluctuations in Precambrian athmospheric oxygen recorded by chromium isotopes. *Nature,* v.461, p.250-254.
- **Frei, R.**, Dahl, P.S., Frandsson, M.M., Jensen, L.A, Hansen, T.R., Terry, M.P., and Frei, K.M. (2009) Lead-isotope and trace-element geochemistry of Paleoproterozoic metasedimentary rocks in the Lead and Rochford basins (Black Hills, South Dakota, USA): Implications for genetic models, mineralization ages, and sources of ore leads for the Homestake gold deposit. *Precambrian Research*, v.172, p.1-24.
- Sand, K.K., **Waight, T.E**., Pearson, D.G., Nielsen, T.F.D., **Makovicky, E**., Hutchison, M.T. (2009) The lithospheric mantle below southern West Greenland: a geothermobarometric approach to diamond potential and mantle stratigraphy. *Lithos*, v.1125, p.1155-1166.
- Søager N. and **Holm, P.M**. (2009) Extended correlation of Paleogene Faroe Island and East Greenland plateau basalts. *Lithos*, v.107, p.205-215.
- **Balić-Žunić, T.,** Garavelli, A., Acquafredda, P., Leonardsen, E., Jakobsson, S.P. (2009): Eldfellite, $NaFe(SO_4)_2$, a new fumarolic mineral from Eldfell volcano, Iceland. *Mineralogical Magazine*, v.73, p.51-57.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	5	0	5
Assist. Professor	1	0	1
Post-doc	2	2	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	12	0	12
Ph.D.	6	2	8

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (DNSRC)
NordForsk
Danish National Research Foundation (DNFR)

6. Three important collaborative research contracts/grants (Inter- & national)

DNRF Center NordCEE; Odense, Copenhagen, Stockholm
DeBeers Botswana Ltd., Gabarone, Botswana
Geobiology Center, University of Bergen, Norway

Group:	Transformation of Cities and Landscapes
Department:	Geography and Geology
Group Leader:	Lasse Møller-Jensen, Associate Professor, 35 32 25 66, lmj@geo.ku.dk

1. Description of Research Field

Urbanisation and landscape change, strategic planning and management of the environment as well as geographic information systems and geoinformatics. Current central research themes are land use changes, urban and regional development, employment and industrial change. Strategies for integrated planning and governance are analyzed within the framework of strategic planning and management. GIS is applied for spatial analysis and optimised use of resources in relation to human activity, and innovative methods for processing of digital geodata are researched and developed.

2. Five newer representative publications

- Smidt-Jensen, S., Skytt, C. B. and Winther L. The Geography of the Experience Economy in Denmark Employment Change and Location Dynamics in Attendance-based Experience Industries, European Planning Studies, 17(6): 847-862. 2009
- Busck, A. G., Hidding, M., Kristensen, S. P., Persson, C. & Præstholm, S.: Managing rurban landscapes in the Netherlands, Denmark and Sweden - Comparing planning systems and instruments in three different contexts. Danish Journal of Geography 108: 1-16. 2008
- Møller-Jensen, L. & Knudsen, M.H.: Patterns of population change in Ghana (1984-2000): urbanization and frontier development. *GeoJournal* 73(4), 307-320, Springer, 2008
- Busck, A. G., Hidding, M., Kristensen, S. P., Persson, C. & Præstholm, S.: Planning approaches for rurban areas - case studies from Denmark, Sweden and The Netherlands. Danish Journal of Geography 109: 81-99.
- Busck, A. G., Kristensen, S.P., Præstholm, S. and Primdahl, J.: Porous landscape - the case of Greater Copenhagen, Urban Forestry & Urban Greening, 7: 145-156. 2008

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	5	0	5
Assist. Professor	0	0	0
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	23	1	24
Ph.D.	2	1	3

5. Three important external sources of income/grants (Funding bodies)

Realdania Foundation
Danida
Outdoor Council

6. Three important collaborative research contracts/grants (Inter- & national)

Centre for Strategic Urban Research
Temaklynge I+II, University of Copenhagen
FFU-Danida

Group:	Geomorphology, Processes and Landscapes
Department:	Geography and Geology
Group Leader:	Morten Pejrup, Professor, 35 32 25 05, mp@geo.ku.dk

1. Description of Research Field

The research focus is on the study of recent sediment transport processes, morphology and stratigraphy in order to describe, interpret and model the formation and change of landscapes. Time scales considered range from seconds to millennia, and study themes cover topics such as sand dune formation; morphodynamics in the coastal zone; fluvial studies, and paleogeographic reconstructions of Holocene and environments. The research is carried out with an Earth System Science perspective including the impact of man.

2. Five newer representative publications

- Clemmensen LB, Murray A, Heinemeier J,de Jong,R. (2009) The evolution of Holocene coastal dunefields, Jutland, Denmark: A record of climate change over the past 5000 years: Geomorphology, 105, 303-313.
- Nielsen L, Møller I, Nielsen LH, Johannessen, P. N, Pejrup, M., Andersen, T. J., Korshoj, J. (2009**)** Integrating ground-penetrating radar and borehole data from a Wadden Sea barrier island. Jour. Of Applied Geophysics, 68, 47-59.
- Pedersen, J.B.T., Svinth, S., Bartholdy, J. (2009) Holocene evolution of a drowned melt-water valley in the Danish Wadden Sea. Quaternary Res.,72, 68-79.
- Aagaard, T., Kroon, A. Hughes, M. G., Greenwood, B. (2008) Field observations of nearshore bar formation. Earth Surface Processes and Landforms, 33, 1021-1032.
- Mernild, S.H., Liston, G. E., Hasholt B. (2008) East Greenland freshwater runoff to the Greenland-Iceland-Norwegian Seas 1999-2004 and 2071-2100. Hydrological processes, 22, 4571-4586.

3. Staff

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	6	0	6
Assist. Professor	0	0	0
Post-doc	1	1	2

4. Graduate students

Type	Internal	External	Total
M.Sc.	10	0	10
Ph.D.	3	1	4

5. Three important external sources of income/grants (Funding bodies)

Carlsberg Foundation
Danish Natural Science Research Council (DNSRC)
European Union

6. Three important collaborative research contracts/grants (Inter- & national)

Recent and Fossil Coastal Systems (REFLEKS). With Geological Survey of Denmark and Greenland (GEUS), Nordic Laboratory of Luminescence, and University of Aarhus.
Storm and storm-surge control of suspended sediment transport in tidal basins. DNSRC grant with GKSS, Germany and DTU, Denmark
Danish Coasts and Climate Adaptation – flooding risk and coastal protection (Coadapt). Danish Council for Strategic Research grant with Danish Hydraulic Institute (DHI) and Danish Coastal Authority (DCA).

Group:	Environment and Society in Developing Countries
Department:	Geography and Geology
Group Leader:	Anette Reenberg, Professor, 35 32 25 62, ar@geo.ku.dk

1. Description of Research Field

We address the issues of globalization processes and human dimensions of global change in developing countries as well as Earth Observation. The key research areas are: Land use and land cover change, natural resource management and livelihood strategies; Urbanization, migration, rural-urban linkages and livelihood changes; Industrialization processes and globalization: Adaptation of land use and natural resource management to climate change; Earth Observation used for terrestrial ecosystem monitoring/modeling of natural resource management.

2. Five newer representative publications

- Turner II, B.L., Lambin, E.F., and Reenberg, A., 2007. The Emergence of Land Change Science for Global Environmental Change and Sustainability. PNAS 104(52):20666-20671.
- Mertz, O., Halsnæs, K., Olesen, J.E., and Rasmussen, K.,2009. Adaptation to climate change in developing countries. Environmental Management 43(5): 743-752.
- Fensholt R, Rasmussen K, Nielsen T.T, and Mbow C., 2009. Evaluation of earth observation based long term vegetation trends - Intercomparing NDVI time series trend analysis consistency of Sahel from AVHRR GIMMS, Terra MODIS and SPOT VGT data. Remote Sensing of Environment, 113, 1886-1898.
- Agergaard, J., Fold, N. and Gough, K.V. (eds) 2009. Rural-urban dynamics: livelihoods, mobility and markets in African and Asian frontiers. Routledge, Oxford
- Agergaard, J, Fold, N. and Gough, K.V., 2009 .Global-local interactions: socioeconomic and spatial dynamics in Vietnam's coffee frontier. Geographical Journal, 175(2): 133-145.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	7	0	7
Assist. Professor	0.5	0.5	1
Post-doc	0	4	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	18	0	18
Ph.D.	4	9	13

5. Three important external sources of income/grants (Funding bodies)

DANIDA-FFU
Danish Research Councils (Det Frie Forskningsråd, FSE, FTP)
European Union

6. Three important collaborative research contracts/grants (Inter- & national)

'RUCROP' - Rural-urban Complementarities for the Reduction of Poverty
AMMA-EU – African Monsoon Multidisciplinary Analysis (>60 partners; IGG responsible for Human Dimension WP)
The Global Land Project – A joint research program of IGBP and IHDP; IGG hosts the International Project Office and chair the international scientific steering committee.

Group:	Basin Studies Group
Department:	Geography and Geology
Group Leader:	Finn Surlyk, Professor, 35 32 24 53, finns@geo.ku.dk

1. Description of Research Field

Sedimentary basins contain fundamental information on changes in surface dynamic processes, environmental and climate history. The Basin Studies Group undertakes analyses and syntheses of sedimentary successions based on field work, boreholes, seismic data, stable isotopes and additional laboratory work, as well as theoretical modeling of basinal parameters, and climatic and oceanographic boundary conditions. The group applies a wide range of stratigraphical, sedimentological, palaeobiological, geochemical, structural and geophysical methods.

2. Five newer representative publications

- Hede, M.U., Rasmussen, P., Noe-Nygaard, N., Clarke, A., Vinebrooke, R., Olsen, J., in press. Terrestrial and aquatic ecosystem response to the 8200 B.P. cold event as recorded in lacustrine sediments from lake Højby Sø, Denmark. Journal of Quaternary Research
- Madsen, H.B., Stemmerik, L., 2009. Early diagenetic Celestine replacement of demosponges in Upper Campanian-Upper Maastrichtian chalk, Stevns, Denmark. Geology 37, 355-358.
- Fyhn, M.B.W., Boldreel, L.O., Nielsen, L.H., 2009. Tectonic and climatic control on growth and demise of the phanh Rang carbonate platform offshore South Vietnam. Basin Research 21, 225-251.
- Lauridsen, B.W., Gale, A.S., Surlyk, F., 2009. Benthic macrofauna variations and community structure in Cenomanian cyclic chalk-marl from Southerham Grey Pit, SE England. Journal of the Geological Society 166, 115--127
- Korte C., Pande P., Kalia P., Kozur H.W., Joachimski M.M., Oberhänsli H., 2009. Massive volcanism at the Permian-Triassic boundary and its impact on the isotopic composition of the ocean and atmosphere. J. Asian Earth Sci. doi:10.1016/j.jseaes.2009.08.012

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	4	0	4
Assoc. Professor	8	0	8
Assist. Professor	1	0	1
Post-doc	4	1	5

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	14	2	16
Ph.D.	7	2	9

5. Four important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
Carlsberg Foundation
Maersk Oil and Norwegian Oil Industry
DONG Energy

6. Five important collaborative research contracts/grants (Inter- & national)

Partnership with University of Bergen in Petromaks- an oil industry financed project.
Statoil – Research cooperation in the Arctic; DONG Energy; Geological Survey of Denmark and Greenland (GEUS); Nordic Center for Earth Evolution, Danish National Research Foundation.

Group:	Geologically Applied Geophysics
Department:	Geography and Geology
Group Leader:	Hans Thybo, Professor, 35 32 24 52, thybo@geo.ku.dk

1. Description of Research Field

Application of physical methods to studies of the Earth's interior, including seismology, potential field methods, geoelectric methods, georadar methods, geothermal and geodynamic modelling. The study targets include secular evolution of the continental lithosphere, mantle structure and dynamics, orogenic processes, rift processes, structure and dynamics of sedimentary basins, oceanic break-up and formation of continental margins, hydrogeophysics, neotectonics, and topography.

2. Five newer representative publications

- Anell, I., Thybo, H., and Artemieva, I., 2009. Cenozoic uplift and subsidence in the North Atlantic region: Geological evidence revisited. Tectonophysics, doi:10.1016/j.tecto.2009.04.006.
- Artemieva, I.M., 2009, The continental lithosphere: Reconciling thermal, seismic, and petrologic data. Lithos, 109, 23-46
- Døssing, A., Dahl-Jensen, T., Thybo, H., Mjelde, R. and Nishimura, Y., 2008. East Greenland Ridge in the North Atlantic Ocean: An integrated geophysical study of a continental sliver in a boundary transform fault setting, J. Geophys. Res., 113, doi:10.1029/2007JB005536.
- Nielsen, L. and Clemmensen, L.B., 2009, Sea-level markers identified in ground-penetrating radar data collected across a modern beach ridge system in a microtidal regime. Terra Nova, 21, 474-479
- Thybo, H. and Nielsen, C.A. , 2009, Magma-compensated crustal thinning in continental rift zones. Nature, doi:10.1038/nature07688.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	1	3
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	6	0	6
Ph.D.	1	4	5

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
Carlsberg Foundation
Oil companies: Maersk Oil and Gas, Philips Petroleum

6. Three important collaborative research contracts/grants (Inter- & national)

TopoGreenland, funded through FNU and NSF on seismological and seismic studies of lithosphere structure in eastern Greenland. Collaboration between IGG, GEUS, and University of Oklahoma.
TopoScandes, funded through ESF in collaboration with Norwegian Geological Survey, Universities of Oslo, Amsterdam, Bergen, Karlsruhe, Uppsala and Aarhus.
DOBRE, seismic programme in Ukraine, with Ukrainian Academy of Sciences, Polish Academy of Sciences, UKr-geophysics (Oil Company).

6. DEPARTMENT OF MATHEMATICAL SCIENCES

Groups:

- **Statistics and probability theory**
- **Geometric Analysis and Mathematical Physics**
- **Topology**
- **Algebra and Number Theory**
- **Non-Commutative Geometry**
- **Mathematical and Statistical Methods in Insurance and Economics**

Group:	Statistics and probability theory
Department:	Mathematical Sciences
Group Leader:	Susanne Ditlevsen, Associate Professor, 35 32 07 85, susanne@math.ku.dk

1. Description of Research Field

The research in the group covers topics ranging from probability theory and mathematical statistics to applied statistics. Main themes include Markov processes, inference for statistical models based on stochastic processes, principles for statistical inference in general, asymptotic statistical theory, missing data and applications of statistical methodology and stochastic processes in bioinformatics, neuroscience, physiology, and earth science.

2. Five newer representative publications

- H. Sørensen. Small sample distribution of the likelihood ratio test in the random effects model. *Journal of Statistical Planning and Inference*, 138, 1605-1614, 2008.
- N.R. Hansen. Statistical models for local occurrences of RNA-structures. *Journal of Computational Biology*, 16(6), 845-858, 2009.
- M. Jacobsen, T. Mikosch, J. Rosinski, G. Samorodnitsky. Inverse problems for regular variation of linear filters, a cancellation property for σ-finite measures and identification of stable laws. *Ann. Appl. Probab*. 19, 210-242, 2009.
- Gloter, M. Sørensen. Estimation for stochastic differential equations with a small diffusion coefficient. *Stoch. Proc. Appl*., 119, 679-699, 2009.
- S. Ditlevsen, O. Ditlevsen. Parameter estimation from observations of first-passage times of the Ornstein-Uhlenbeck process and the Feller process. *Probabilistic Engineering Mechanics*, 23, 170-179, 2008.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	6	0	6
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	18	0	18
Ph.D.	2	1	3

5. Three important external sources of income/grants (Funding bodies)

University of Copenhagen Excellence Programme
Danish Natural and Social Science Research Council
Villum Kann Rasmussen Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Center for Accounting and Finance
Point Process Modeling and Statistical Inference
Center for Research in Econometric Analysis of Time Series (Danish National Research Foundation)

Group:	Geometric Analysis and Mathematical Physics
Department:	Mathematical Sciences
Group Leader:	Bergfinnur Durhuus, Professor, 35 32 07 35, durhuus@math.ku.dk

1. Description of Research Field

The group covers research in a wide range of fields related to mathematical analysis, in particular, geometric analysis and mathematical physics. The topics include the representation theory of continuous symmetry groups, classical analysis, analytic number theory, numerical analysis with applications in financial mathematics, and history of mathematics with emphasis on the history of analysis and the interplay of mathematics and physics. In mathematical physics the research is on the rigorous analysis of the structure of matter and quantum gravity. The geometric analysis concentrates on partial differential operators on manifolds and related geometric invariants.

2. Five newer representative publications

- E. P. van den Ban and H. Schlichtkrull, A Paley-Wiener theorem for reductive symmetric spaces. Annals of Math. (2) 164 (2006), no. 3, 879-909.
- C. Berg and H. L. Pedersen, On some results of Cufaro Petroni about Student t-processes. J. Phys. A: Math. Theor. 41 (2008), 265004.
- B. Durhuus, T. Jonsson and J. F. Wheater: The spectral dimension of generic trees. J. Stat. Phys. 128. (2007), 1237-1260.
- G. Grubb, Distributions and Operators, Graduate text in Mathematics 252, Springer Verlag, 2009, 461pp.
- J. P. Solovej, W. Spitzer and T. Ø. Sørensen, The relativistic Scott correction for atoms and molecules. Comm. Pure and Applied Math. 63 (2010) 39-118

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	5.4	0	5.4
Assoc. Professor	3	0	3
Assist. Professor	0	2	2
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	7	0	7
Ph.D.	2.5	0.5	3

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
European Union
European Science Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Natural Science Research Council network: Mathematical physics and partial differential equations
Danish Natural Science Research Council network: The history and philosophy of mathematic
Marie Curie Research and Training Network: Random Geometry and Random Matrices (Enrage)
Nordic Research network: Analysis and applications

Group:	Topology
Department:	Mathematical Sciences
Group Leader:	Jesper Grodal, Professor, 35 32 06 86, jg@math.ku.dk

1. Description of Research Field

The group is concerned with research in topology, the study of geometric objects, or multidimensional shapes. The group is known in particular for its study of symmetry groups via topological tools and methods. This includes generalizations of the notion of a group of symmetries (p-compact groups, p-local finite groups), the study of ways to differentiate functions on arbitrary shapes (surgery theory) and the study of geometric objects, the points of which parametrize other geometric objects (moduli spaces).

2. Five newer representative publications

- Hambleton and E. Pedersen "Topological equivalence of linear representations of cyclic groups. I", Ann. of Math. 161 (2005) 61-104.
- N. Wahl "Homological Stability for the mapping class groups of non-orientable surfaces" Invent. Math 171 (2008), 389-424.
- K. Andersen, J. Grodal, J. Møller, and A. Viruel: "The classification of p-compact groups for podd" Ann. of Math. 167 (2008) 96-210.
- K. Andersen and J. Grodal "The classification of 2-compact groups" J. Amer. Math. Soc. 22 (2009) 387-436.
- S. Galatius, U. Tillmann, I. Madsen, M. Weiss "The homotopy type of the cobordism category", Acta Math. 202 (2009) 195-239.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	2	0	2
Assist. Professor	0	0	0
Post-doc	5	5	10

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	8	0	8
Ph.D.	2	0	2

The group has recently undergone an expansion, so the student numbers are expected to increase.

5. Three important external sources of income/grants (Funding bodies)

European Science Foundation
Danish National Research Foundation
Danish Natural Science Research Council (DNSRC)

6. Three important collaborative research contracts/grants (Inter- & national)

"Large framework grant" from DNSRC.
Application for ESF Network grant under preliminary preparation.
Application for Nordic Research Network Grant under preliminary preparation.

Group:	Algebra and Number Theory
Department:	Mathematical Sciences
Group Leader:	Ian Kiming, Associate Professor, 35 32 07 58, kiming@math.ku.dk

1. Description of Research Field

The group covers a number of distinct areas of mathematics. A common feature in the research of the group is the dominating use of algebraic (and combinatorial) methods. These methods are used to study fundamental questions about structures such as polynomial equations, algebraic numbers, algebraic curves, as well as much more abstract structures which have their roots in fundamental both solved and unsolved problems. Examples of applications of this area of mathematics are coding theory and cryptography.

2. Five newer representative publications

- S. Jøndrup: Factorization in noncommutative curves, Linear Algebra Appl. 431 (2009), 985-990.
- Chen, I. Kiming, J. B. Rasmussen: On congruences mod ${\mathfrak p}^m$ between eigenforms and their attached Galois representations, to appear in J. Number Theory (2010), 12 pages.
- Kiming: New models for the action of Hecke operators in spaces of Maass wave forms, Ann. Inst. Fourier (Grenoble) 57 (2007), 1863-1882.
- J. B. Olsson: Sign conjugacy classes in symmetric groups, Journal of Algebra 322 (2009) 2793-2800.
- D. Laksov, A. Thorup: Schubert calculus on Grassmannians and exterior powers, Indiana Univ. Math. J. 58 (No. 1) (2009), 283-300.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2.75	0	2.75
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	0	4
Ph.D.	0	0	0

5. Three important external sources of income/grants (Funding bodies)

The Danish Council for Independent Research | Natural Sciences.
One post doc financed via the University of Copenhagen Excellence Program.

6. Three important collaborative research contracts/grants (Inter- & national)

None at the moment

Group:	Non-Commutative Geometry
Department:	Mathematical Sciences
Group Leader:	Ryszard Nest, Professor, 35 32 07 29, rnest@math.ku.dk

1. Description of Research Field

The famous Gelfand theorem asserts that all properties of a compact topological space are encoded in terms of continuous complex-valued functions. Such functions form a commutative (under point-wise multiplication) C*-algebra. It has gradually become apparent that general (noncommutative) C*-algebras admit many constructions analogous to those familiar from classical geometry and topology. In this way, in noncommutative geometry (NCG) the focus is shifted from spaces as collections of points to abstract noncommutative algebras, the elements of which are thought of as functions on the underlying virtual quantum (or noncommutative) space. This leads to applications in geometric group theory, noncommutative probability theory, mathematical physics, deformation theory and topology.

2. Five newer representative publications

- Christensen, Erik; Ivan, Cristina, *Extensions and degenerations of spectral triples* Comm. Math. Phys.285 (2009), no. 3, 925-955.
- Niels Grønbæk, *Bounded Hochschild cohomology of Banach algebras with a matrix-like structure*, Trans. Amer. Math. Soc., 358(6): 2651-2662, 2006
- Uffe Haagerup, Magdalena Musat, *Classification of hyperfinite factors up to completely bounded isomorphism of their preduals*, J. Reine Angew. Math., 630 (2009), 141-176.
- Nest, Ryszard; Aastrup, Johannes; Grimstrup, Jesper Møller, *On spectral triples in quantum gravity: I*; Classical and Quantum Gravity. 2009, vol. 26, nr. 6, 2009
- Mikael Rørdam, Etienne Blanchard and Randi Rohde, *Properly infinite C(X)-algebras and K_1-injectivity*. J. Noncommutative Geometry **2** (2008), no. 3, 263-282.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	4	1	5
Assoc. Professor	3	0	3
Assist. Professor	0	0	0
Post-doc	0	4	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	0	0
Ph.D.	8	2	10

5. Three important external sources of income/grants (Funding bodies)

Danish Research Council
Danish National Research Foundation
EU

6. Three important collaborative research contracts/grants (Inter- & national)

QSNG -EU-training network
Center for Symmetry and Deformations (Danish National Research Foundation)
University of Copenhagen Excellence Program

Group:	Mathematical and Statistical Methods in Insurance and Economics
Department:	Mathematical Sciences
Group Leader:	Mogens Steffensen, Professor, 35 32 07 89, mogens@math.ku.dk

1. Description of Research Field

The research of the group is oriented towards applications of mathematics, probability, and statistics in insurance and economics, including mathematical finance. The members of the group are responsible for the Bachelor and Master education in Actuarial Science and Mathematics & Economics at the University of Copenhagen.

2. Five newer representative publications

- J. F. **Collamore** (2009) Random recurrence equations and ruin in a Markov-dependent stochastic economic environment. *Ann. Appl. Probab.* 19(4), 1404-1458.
- M. Jacobsen, T. **Mikosch**, J. Rosinski, J. and G. Samorodnitsky (2009) Inverse problems for regular variation of linear filters, a cancellation property for sigma-finite measures, and identification of stable laws. *Ann. Appl. Probab.* 19, 210-242.
- J. **Paulsen** (2008) Ruin models with investment income. *Probability Surveys*. 5, 416-434.
- R. **Poulsen**, K.R. Schenk-Hoppe, and C.-O. Ewald (2009) Risk Minimization in Stochastic Volatility Models: Model Risk and Empirical Performance, Quantitative Finance, 9(6), 693-704.
- H. Kraft and M. **Steffensen** (2009) Asset Allocation with Contagion and Explicit Bankruptcy Procedures. *Journal of Mathematical Economics* 45(1-2), 147-167.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	4	0	4
Assoc. Professor	2	0	2
Assist. Professor	1	0	1
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	120	10	130
Ph.D.	2	2	4

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (DNSRC)
Danish Agency for Science Technology and Innovation

6. Three important collaborative research contracts/grants (Inter- & national)

DNSRC Research Grant (jointly with scientists in Copenhagen, Aalborg): Point process modeling and statistical inference.
Danish Center for Accounting and Finance

7. DEPARTMENT OF SCIENCE EDUCATION

Group:

- **Didactics of Science**

Group:	Didactics of Science
Department:	Science Education
Group Leader:	Carl Winsløw, Professor, 35 32 04 33, winslow@ind.ku.dk

1. Description of Research Field
Didactical design in science education: Learning and design theory, didactical engineering.
Curriculum development and implementation, epistemological aspects of science in education.
Students' experiences and meaning making in science studies. In- and pre-service science teacher education at tertiary and upper secondary level. Informal learning environments: didactics in science centres and science museums.

2. Five newer representative publications

- Madsen, L. M. & Winsløw, C. (2009). Relations between teaching and research in physical geography and mathematics at research-intensive universities International Journal of Science and Mathematics Education vol. 7, 741-763.
- Ulriksen, L. (2009). The implied student. Studies in Higher Education 34(5), 517-532.
- Johannsen, B., Linder, C. and Rump, C. (2009) Experiences of causality of attrition: a perspective from former physics undergraduate students. In A Bilsel and M. Garip (Eds), Frontiers in Science Education Research Eastern Mediterranean University Press, 2009. s. 51-60.
- Miyakawa, T. & Winsløw, C. (2009). Didactical designs for students' proportional reasoning: An "open approach" lesson and a "fundamental situation". Educational Studies in Mathematics 72(2), 199-218.
- Christiansen, F. & Rump, C. (2008). Three conceptions of thermodynamics: Technical matrices in science and engineering. Research in Science Education 38(5), 545-564.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	6	1	7
Assist. Professor	0	0	0
Post-doc	1	0	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	9	0	9
Ph.D.	4	1	5

5. Three important external sources of income/grants (Funding bodies)
European Union
Danish Ministry of Education
VELUX

6. Three important collaborative research contracts/grants (Inter- & national)
S-TEAM (FP7 Sci.&Soc. 2009-2013) this group's share is 320.523 €
IRIS (FP7 Sci.&Soc. 2009-2012) IND this group's share is 174.388 €
Mind the Gap (FP7 Sci. & Soc. 2007-2010) IND this group's share is 114.713 €

8. NATURAL HISTORY MUSEUM OF DENMARK

Groups:

- **Centre for Star and Planet Formation**
- **Geology**
- **Botany**
- **Vertebrate Zoology**
- **Invertebrate Zoology**
- **Entomology**
- **Laboratory of Molecular Systematics**
- **GeoGenetics**

Group:	Centre for Star and Planet Formation
Department:	Natural History Museum of Denmark
Group Leader:	Martin Bizzarro, Professor, 28 51 99 82, bizzarro@snm.ku.dk

1. Description of Research Field

Our research activities are aimed at exploring the origin and evolution of planetary systems from a dynamic perspective, merging the disciplines of cosmochemistry, astrophysics and astronomy. Our goal is to provide observational and theoretical constraints that will help unravel the early history of our solar system in the context of its astrophysical setting, from collapse of the molecular cloud through condensation and evolution of primitive solids and ultimately formation of asteroids and terrestrial planets. We hope to understand the circumstances allowed for the formation of the terrestrial planets in our solar system, including the preservation of water worlds like Earth, where life has been thriving for nearly 4 billion years.

2. Five newer representative publications

- Trinquier, A, Elliott, T., Ulfbeck, D., Coath, C., Krot, A.N. & Bizzarro, M. (2009) Origin of nucleosynthetic isotope heterogeneity in the solar protoplanetary disk. *Science* **324**: 374 - 376.
- Jørgensen, U.G., Appel, P.W.U., Hatsukawac, Y., Frei, R., Oshima, M., Toh, Y. & Kimura, A. (2009) The Earth–Moon system during the late heavy bombardment period – Geochemical support for impacts dominated by comets. *Icarus* **204**: 368-380.
- Lunttila, T., Padoan, P., Juvela, M. & Nordlund, Å. (2009) The Super-Alfvénic Model of Molecular Clouds: Predictions for Mass-to-Flux and Turbulent-to-Magnetic Energy Ratios. *Astrophysical Journal* **702**: L37-L41.
- Connelly, J.N., Amelin, Y., Krot, A.N. & Bizzarro, M. (2008) Chronology of the solar system's oldest solids. *Astrophysical Journal* **675**, L121-L124.
- Bizzarro, M., Ulfbeck, D., Trinquier, A., Thrane, K., Connelly, J. N. & Meyer, B.S. (2007) Evidence for a late supernova injection of Fe into the protoplanetary disk. *Science* **316**: 1178-1181.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	2	1	3
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	0	2
Ph.D.	3	1	4

5. Three important external sources of income/grants (Funding bodies)

University of Copenhagen Excellence Programme – from 06/2008 to 06/2013 – 17.887.524 kr
Danish Natural Science Research Council – from 01/2008 to 12/2010 – 3.903.637 kr
Danish National Research Foundation – from 06/2009 to 06/2014 – 34.000.000 kr

6. Three important collaborative research contracts/grants (Inter- & national)

Hawai'i Institute of Geophysics and Planetology, University of Hawai'i at Manoa, Honolulu, HI, USA
Department of Earth Sciences, University of Bristol, Bristol, United Kingdom
School of Earth Sciences, Victoria University of Wellington, Wellington, New Zealand.

Group:	Geology
Department:	Natural History Museum of Denmark
Group Leader:	David Harper, Professor, 35 32 23 71, dharper@snm.ku.dk

1. Description of Research Field

Geology is the study of the composition and structure of the Earth, the evolution of biological and geological processes through deep time, and its relationship to other bodies in space and the Solar System. Particular focuses of the group are the environment and evolution of early Earth systems, biotic diversification and extinction events through time, mineral and petrological composition of the Earth.

2. Five newer representative publications

- Benton, M.J. and **Harper, D.A.T.** 2009. *Introduction to Paleobiology and the Fossil Record*. Wiley-Blackwell, Oxford. 598 pp (softback).
- Buffetaut, E., **Cuny, G.**, Loeuff, J. Le and Suteethorn, V. (eds) 2009. Late Palaeozoic and Mesozoic continental ecosystems in SE Asia. *Geological Society Special Publication*, 315, 306 pp.
- Larsen, L.M. and **Pedersen, A.K.** 2009. Petrology of the Paleocene picrites and flood basalts on Disko and Nuussuaq, West Greenland. *Journal of Petrology*, 50, 1667-1711.
- Furnes, H., **Rosing, M.T**., Dilek, Y and De Wit, M. 2009. Isua supracrustal belt (Greenland) – a vestige of a 3.8 Ga suprasubduction zone ophiolite, and the implications for Archean geology. *Lithos* 113, 115-132.
- Servais, T., **Harper, D.A.T.**, Li Jun, Munnecke, A., Owen, A. and Sheehan, P. 2009. The Great Ordovician Biodiversification Event (GOBE): Influences of paleogeography, paleoclimate and, paleoecology. *GSA Today* 19, 4-10.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	5	0	5
Assist. Professor	0	0	0
Post-doc	0	6	6

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	6	0	6
Ph.D.	4	2	6

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
Danish Natural Science Research Council
Geocenter Denmark

6. Three important collaborative research contracts/grants (Inter- & national)

Danish National Research Foundation: NordCEE Nordic Center for Earth Evolution (Rosing is co-leader of the project).
EU financed SYNTHESYS/SYNTHESYS_2 infrastructure program for guest researchers to museum collections (Harper is deputy leader of Copenhagen facility).
Shell International: Hydrocarbon exploration in the Alum Shale of Scania (Nielsen is geological consultant).

Group:	Botany
Department:	Natural History Museum of Denmark
Group Leader:	Henning Knudsen, Associate Professor, 35 32 21 86, henningk@snm.ku.dk

1. Description of Research Field

Research is focused on taxonomy, phylogeny and biogeography of terrestrial and marine plants and fungi using a variety of morphological and phylogenetical methods incl. comparative evolution of plant organelle genomes, barcoding, reticulate evolution and evolution of transposable elements. Ex tissue conservation biology is performed through tissue cultures and propagation in greenhouses. Projects are concentrated in the North Atlantic area, Eastern Asia and the horn of Africa.

2. Five newer representative publications

- Lo, E.Y.Y., Stefanovic, S., **Christensen, K.I.** & Dickinson, T. A., 2009: Evidence for genetic association between East Asian and western North American *Crataegus* L. (Rosaceae) and rapid diversion of the eastern North American lineages based on multiple DNA sequences. – Molecular Phylogenetics and Evolution 51: 157-168.
- Hedberg, I., **Friis, I.** & Persson, E. (eds): Flora of Ethiopia and Eritrea, vol. 1: Lycopodiaceae - Pinaceae & Appendix. – Addis Abeba; Uppsala. 2009. 305 s.
- Hedberg, I., **Friis, I.** & Persson, E. (eds): Flora of Ethiopia and Eritrea, vol. 8: General part and index to vols 1-7. - Addis Abeba; Uppsala: National Herbarium, Addis Abeba University, 2009. 331 s.
- Ortiz, S., Bonifacino, M., Crisci, J.V., Funk, V.A., **Hansen, H.V.**, Hind, D.J.N., Katinas, L., Roque, N., Sancho, G., Susanna, A. & Telleria, M.C., 2009: The basal grade of Compositae: Mutisieae (sensu Cabrera) and Carduoideae. In: Funk, V.A., Susanna, T. & Bayer, R. (eds): Systematics, Evolution and Biogeography of the Compositae p. 193-213. – IAPT, Washington.
- **Petersen, G., Seberg, O.**, Thorsøe, S., **Jørgensen, T.** & Mathew, B., 2008. A phylogeny of the genus *Crocus* (Iridaceae) based on sequence data from five plastid regions. -Taxon 57: 487-499.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	8	2,5	10,5
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	0	0
Ph.D.	1	0	1

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
Aage V. Jensens Nature Foundation
The Andrew W. Mellon Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

National Science Foundation - From *Acorus* to *Zingiber*: assembling the phylogeny of the monocotyledons.
African Plant Initiative
Det danske svampeatlas

Group:	Vertebrate Zoology
Department:	Natural History Museum of Denmark
Group Leader:	Peter Rask Møller, Associate Professor, 35 32 10 70, pdrmoller@snm.ku.dk

1. Description of Research Field

Collection based research in taxonomy, phylogeny, biogeography, migration and conservation of vertebrates. Focus on Danish Arctic, coral reef and deep-sea fishes; Passeriform birds and birds of Denmark, Faroe Islands, South America and Africa; bat faunas of Europe and Africa. Evolution in general, but with focus on speciation, endemism and habitat choice. Atlas projects on Danish fresh- and marine fishes and mammals and bird movements of Danish as well as Faroese birds.

2. Five newer representative publications

- Ahlén, I., Baagøe, H.J. & Bach, L. 2009 (in press). Behavior of Scandinavian bats during migration and foraging at sea. Journal of Mammalogy 90 (6) p. 000-000.
- Fjeldså, J. & Irestedt, M. 2009. Diversification of the South American avifauna: patterns and implications for conservation in the Andes. Ann. Missouri Bot. Garden 96: 398-409.
- Poulsen, J.Y., Møller, P.R., LAVOUÉ, S., Knudsen, S.W., Nishida, M and Miya, M. 2009. Higher and lower level relationships of the deep-sea fish order Alepocephaliformes (Teleostei: Otocephala) inferred from whole mitogenome sequences. Biological Journal of the Linnean Society, 2009, 98: 923–936.
- Møller, P.R. & Schwarzhans, W. 2008. Review of the Dinematichthyini (Teleostei, Bythitidae) of the Indo-West pacific. Part IV. Dinematichthys and two new genera with description of nine new species. The Beagle, Records of the Museum and Art Galleries of the Northern Territory 23: 29-110.
- Thorup, K., Bisson, I.-A., Bowlin, M. S., Holland, R. A., Wingfield, J. C., Ramenofsky, M., Wikelski, M. 2007. Evidence for a navigational map stretching across the continental U.S. in a migratory songbird. Proceedings of the National Academy of Sciences 104, 18115-18119.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	3,5	0,5	4
Assist. Professor	0	0	0
Post-doc	0	3	3

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	1	3	4
Ph.D.	2	0	2

5. Three important external sources of income/grants (Funding bodies)

Aage V. Jensens Fonde
The Danish National Research Foundation (University of Copenhagen program of Excellence)
DTU sat project: Danish Technical University: Solving the Mystery of Bird Migration: Tracking Small Birds from Space.

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Center for Macroecology and Evolution - a center funded by The Danish Natural Science Research Council and the University of Copenhagen Excellence Programme – Jon Fjeldså og Kasper Thorup. PI Carsten Rahbek, Biological Institute, KU.
Danish Marine Fish Atlas: collaboration with DTU-Aqua and Krog Consult., funded by the Aage V. Jensen foundation.
Copenhagen Bird Ringing Centre, partly funded by the Forrest and Nature Agency.

Group:	Invertebrate Zoology
Department:	Natural History Museum of Denmark
Group Leader:	Jørgen Olesen, Associate Professor, 35 32 10 45, jolesen@snm.ku.dk

1. Description of Research Field

Evolutionary relationship (systematics), diversity and zoogeography of invertebrates (molluscs, annelids, crustaceans, sponges, etc.) which comprise the majority of all animal species living in the world oceans. A variety of disciplines is involved, spanning from reconstruction of evolutionary history, both at high and low taxonomic level, to survey of the Boreal, Arctic, Antarctic, and Danish fauna. The research is primarily collection-based and includes DNA-based systematics, anatomical studies using cutting-edge methods in light and electron microscopy, as well as various classical methods.

2. Newer representative publications

- Dunn, C. W., Hejnol, A., Matus, D. Q., Pang, K., Browne, W. E., Smith, S. A., Seaver, E., Rouse, G. W., Obst, M., Edgecombe, G. D., Sørensen, M. V., Haddock, S. H. D., Schmidt-Rhaesa, A., Okuso, A., Kristensen, R. M., Wheeler, W. C., Martindale, M. Q. & Giribet, G. 2008. Broad phylogenomic sampling improves resolution of the animal tree of life. Nature 452: 745-749.
- Eibye-Jacobsen, D. 2007. A preliminary phylogenetic analysis of Poecilochaetidae (Annelida: Polychaeta). – Marine Ecology 26: 171-180.
- Heiner, I., R. M. Kristensen. 2008. *Urnaloricus gadi* nov. gen. et nov. sp. (Loricifera, Urnaloricidae nov. fam.), an aberrant Loricifera with a viviparous pedogenetic life cycle. Journal of Morphology 270: 129-153.
- Maas, A, C. Haug, J. T. Haug, J. Olesen, X.-G. Zhang, D. Waloszek. 2009. Early crustacean evolution and the appearance of epipodites and gills. Arthropod Systematics & Phylogeny 67(2): 255-273.
- Spetland, F., H.T. Rapp, F. Hoffmann & O.S. Tendal, 2007: Sexual reproduction of *Geodia barretti* Bowerbank, 1858 (Porifera, Astrophorida) in two Scandinavian fjords. - Pp 613-620 *in:* Custódio, M.R., G. Lôbo-Hajdu, E. Hajdu & G. Muricy (eds.): Porifera research - biodiversity, innovation and Sustainability. Série Livros 28. Museu Nacional, Rio de Janeiro. 684.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	0	4
Assist. Professor	0	0	0
Post-doc	1	0	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	0	2
Ph.D.	3	1	4

5. Three important external sources of income/grants (Funding bodies)

Danish National Science Foundation
European Union
The A.P. Møller and Chastine Mc-Kinney Møller Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

AtoL project (Assembling the Tree of Life) financed by NSF: "Protostome tree of life"
"The Cambrian Connection" frame grant from the Danish Natural Research Council
Faculty Research Grant Program

Group:	Entomology
Department:	Natural History Museum of Denmark
Group Leader:	Thomas Pape, Associate Professor, 35 32 11 06, tpape@snm.ku.dk

1. Description of Research Field
Systematic Entomology: Collection-based research in taxonomy and systematics of terrestrial arthropods (more than half of all life forms on our planet), including detailed morphological and phylogenetic investigations utilizing a broad spectrum of anatomical characters and implementing use of molecular markers at all taxonomic levels. Setting standards for biodiversity assessment of terrestrial arthropods and serving society with global authority files on scientific names.

2. Five newer representative publications

- Blackledge, T.A., Scharff, N., Coddington, J.A., Szüts, T., Wenzel, J.W., Hayashi, C.Y. & Agnarsson, I. (2009) Reconstructing web evolution and spider diversification in the molecular era. *Proceedings of the National Academy of Sciences* 106: 5229-5234.
- Beutel, R.G., Kristensen, N.P. & Pohl, H. (2009) Resolving insect phylogeny: The significance of cephalic structures of the Nannomecoptera in understanding endopterygote relationships. *Arthropod Structure & Development* 38: 427-460.
- Pape, T., Bickel, D. & Meier, R. (eds) 2009. *Diptera Diversity: Status, Challenges and Tools.* Brill, Leiden, 459 pp.
- Solodovnikov, A. & Schomann, A. (2009) Revised systematics and biogeography of "Quediina" of sub-Saharan Africa bring new insights about the phylogeny of the rove beetle tribe Staphylinini (Coleoptera: Staphylinidae). *Systematic Entomology* 34: 443-466.
- Vilhelmsen L., Miko I. & Krogmann L. (in press) Beyond the wasp-waist: structural diversity and phylogenetic significance of the mesosoma in apocritan wasps (Insecta: Hymenoptera). *Zoological Journal of the Linnean Society*.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	3	0	3
Assist. Professor	1	0	1
Post-doc	1	3	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	1	3	4
Ph.D.	2	3	5

5. Three important external sources of income/grants (Funding bodies)
Danish Natural Science Research Foundation (DNSRC)
Carlsberg Foundation
European Union 7th Framework programme (e-infrastructure).

6. Three important collaborative research contracts/grants (Inter- & national)
DNSRC frame grant: "Terrestrial Arthropods: From trunk to twigs in the 'Tree of Life'" (co-ordinated by Thomas Pape, Natural History Museum of Denmark).
DNSRC Center of Excellence & University of Copenhagen Program of Excellence: "Centre for Macroecology and Evolution" (co-ordinated by Carsten Rahbek, Biological Institute).
EU, 7th Framework programme, INFRA-2008-1.2.2: "4D4Life, Distributed Dynamic Databases for Life" (co-ordinated by Frank Bisby, University of Reading, UK).

Group:	Laboratory of Molecular Systematics
Department:	Natural History Museum of Denmark
Group Leader:	Ole Seberg, Professor, 35 32 21 95, oles@snm.ku.dk

1. Description of Research Field
Comparative Evolution of Plant Organelle Genomes - Monocotyledon phylogeny – Molecular Evolution of Transposable elements – Plant barcoding – Reticulate Evolution (allopolyploidy) – Phylogenetic analysis of Large Data Sets – Alignment of DNA Sequences – Evolution and biogeography of moss bugs (Hemiptera-Coleorrhynca: Peloridiidae)

2. Five newer representative publications

- Seberg, O. & G. Petersen, G. 2007. Phylogeny of the Triticeae (Poaceae) – based on three organelle genes, two single-copy nuclear genes, and morphology. – Aliso 23: 362-371.
- Petersen, G., Seberg, O., Thorsøe, S., Jørgensen, T. & Mathew, B. 2008. A phylogeny of the genus Crocus (Iridaceae) based on sequence data from five plastid regions.– Taxon 57: 487-499.
- Seberg, O. & Petersen, G. 2009. A unified classification system for eukaryotic transposable elements should reflect their phylogeny.– Nature Reviews Genetics 10: 276. (doi:10.1038/nrg2165-c3)
- Seberg, O. & Petersen, G. 2009. How many loci does it take to DNA barcode a crocus? – PLoS One 4(2) (doi:10.1371/journal.pone.0004598)
- Hollingsworth, P.M., Forrest, L.L., Spouge, J.L., Hajibabaei, M., Ratnasingham, S., van der Bank, M., Chase, M.W., Cowan. R.S., Erickson, D.L., Fazekas, A.J., Graham, S.W., James, K.E., Kim, K.–J., Kress. W.J, Schneider. H., van Alphen Stahl, J., Barrett, S.C.H., van den Berg, C., Bogarin, D., Burgess, K.S., Cameron, K. M., Carine, M., Chacón, J., Clark, A.C., Conrad, F., Devey, D., Clarkson. J., Ford, C.S., Hedderson, T.A.J., Hollingsworth, M.L., Husband, B.C., Kelly, L.J., Kesanakurti, P,R., Kim, J.S., Kim, Y.D., Lahaye, R., Lee, H.–L., Long, D.G., Madriñán, S., Maurin, O., Meusnier, I., Newmaster, S.G., Park, C.W., Percy. D.M., Petersen, G., Richardson, J.E., Salazar, G.A., Savolainen, V., Seberg, O., Wilkinson, M.J.,Yi, D.–K. & Little, D.P. 2009. Botanists Recommend a DNA Barcode for Land Plants.– Proceedings of the National Academy of Sciences, USA 106: 12794-12797.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	0	2
Assoc. Professor	0	1	1
Assist. Professor	0	0	0
Post-doc	0	1	1

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	0	0	0
Ph.D.	1	0	1

5. Three important external sources of income/grants (Funding bodies)
European Union – SYNTHESYS/EDIT
Danish Natural Science Research Council

6. Three important collaborative research contracts/grants (Inter- & national)
SYNTHESYS 2– JRA 4. Optimising DNA extraction protocols for herbarium tissue
National Science Foundation - From *Acorus* to *Zingiber*: assembling the phylogeny of the monocotyledons.

Group:	GeoGenetics
Department:	Natural History Museum of Denmark
Group Leader:	Eske Willerslev, Professor, 28 75 13 09, willerslev@snm.ku.dk

1. Description of Research Field

The group's research is centered around i) ancient DNA studies (human migration, past population genetics and environmental reconstructions), ii) evolutionary biology (macro and molecular evolution), iii) classical Quaternary zoology (zooarchaeology, faunal history and palaeoecology) and iv) Quaternary climate and environmental changes (spanning modern ice-sheets to the climate during the previous interglacials).

2. Five newer representative publications

- Gilbert, MTP *et al.* Paleo-Eskimo mtDNA Genome Reveals Matrilineal Discontinuity in Greenland ***Science*** 320, 1787-1789 (2008).
- Willerslev, E *et al.* Ancient Biomolecules from Deep Ice Cores Reveal a Forested Southern Greenland. ***Science*** 317, 111-114 (2007).
- Haile, J *et al.* Ancient DNA reveals late survival of mammoth and horse in interior Alaska. ***Proc. Natl. Acad. Sci. USA*** (In Press.)
- Otto-Bliesner, BL *et al*. Simulating Warm-Arctic Climate and Ice Sheet Sensitivity for the Last Interglaciation. **Science** 311, 1751-1753 (2007).
- Aaris-Sørensen, K. Diversity and dynamics of the mammalian fauna in Denmark throughout the last glacial–interglacial cycle, 115–0 kyr BP. **Fossil and Strata** 57, 1-59 (2009).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	4	1	5
Assist. Professor	0	0	0
Post-doc	0	11	11

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	10	0	10
Ph.D.	3	9	12

5. Three important external sources of income/grants (Funding bodies)

Danish National Science Foundation
European Research Council (ERC)
Lundbeck Foundation

6. Three important collaborative research contracts/grants (Inter- & national)

Climate Change research group, University of Buffalo, USA
Paisley Caves Exploration with University of Oregon USA (NSF)
EcoChange, EU collaborative project

9. NIELS BOHR INSTITUTE

Groups:

- **Eksperimental Subatomic Physics**
- **Astrophysics of Stars and Galaxies**
- **Centre for Ice and Climate**
- **Dark Cosmology Centre**
- **Biocomplexity**
- **Computational Astrophysics**
- **Nano Physics**
- **Theoretical Particle Physics and Cosmology**
- **Quantum Optics and Ultra-Cold Atoms**
- **Earth and Planetary Physics**

Group:	Eksperimental Subatomic Physics
Department:	Niels Bohr Institute
Group Leader:	Hans Bøggild, Associate Professor, 35 32 52 86, boggild@nbi.dk

1. Description of Research Field

Tests of Standard model predictions and search for signatures of new physics beyond the standard model. The ATLAS experiment at the CERN LHC. (HEP Group). Relativistic Heavy Ion Collisions. Physics of the Quark Gluon Plasma. The ALICE Experiment at the CERN LHC. (HEHI Group).

2. Five newer representative publications

- Nuclear Modification Factor for Charged Pions and Protons at Forward Rapidity in Central Au+Au Collisions at 200-GeV, BRAHMS Collaboration (I. Arsene et al.). Phys.Lett.B650:219-223, 2007.
- The ALICE Experiment at the CERN LHC, The ALICE Collaboration, K. Aamodt et al., JINST 3 (2008), 508002.
- First proton-proton collisions at the LHC as observed with the ALICE detector: measurement of the charged particle pseudorapidity density at sqrt(s) = 900 GeV. ALICE Collaboration, Nov 2009. e-Print: arXiv:0911.5430 [hep-ex]
- G. Aad et al. [The ATLAS Collaboration], “Expected Performance of the ATLAS Experiment - Detector, Trigger and Physics'', Jan 2009, arXiv:0901.0512 [hep-ex]
- E.Abat et al.,``The ATLAS TRT electronics,'' JINST 3, P06007 (2008)1.

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	0	3
Assoc. Professor	6	0	6
Assist. Professor	0	0	0
Post-doc	1	6	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	9	0	9
Ph.D.	2	5	7

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council
Carlsberg Foundation
Danish Research Training Committee
European Union
Danish Center for Scientific Computing (DCSC)

6. Three important collaborative research contracts/grants (Inter- & national)

NICE
ALICE (MoU)
ATLAS (MoU)
EGEE-II/KNOWARC

Group:	Astrophysics of Stars and Galaxies
Department:	Niels Bohr Institute
Group Leader:	Jens Viggo Clausen, Associate Professor, 35 32 59 26, jvc@nbi.ku.dk

1. Description of Research Field

Stars are the central engine of the chemical evolution of the Universe. Understanding their formation, evolution and role in their host galaxies is our research focus. Ongoing projects, all with extensive international collaboration, include nucleosynthesis in the early Universe, nearby clusters of galaxies, interstellar matter and star forming regions, the Solar neighbourhood in the Milky Way, stellar evolution model tests from binaries, age calibrations from clusters with binary members, extra solar planets and astronomical instrumentation.

2. Five newer representative publications

- J.V. Clausen et al.: 2009, "Absolute dimensions of solar-type eclipsing binaries. II. V636 Centauri: A 1.05 Msun primary with an active, cool oversize 0.85 Msun secondary", Astronomy & Astrophysics 502, 253
- P.K. Rasmussen et al: 2008, "X-shooter-backbone and UV-blue and visible spectrographs: final AIV and measured performances", Proc. SPIE 7014, 3
- P. Bonifacio et al.: 2009, "First stars XII. Abundances in extremely metal-poor turnoff stars and comparison with the giants", Astronomy & Astrophysics 501, 519
- G. Torres, J. Andersen, A. Gimenez.: 2009, "Accurate masses and radii of normal stars: modern results and applications", Astronomy & Astrophysics Review online (arXiv:0908.2624)
- J. Kainulainen et al.: 2007, "A comparison of density structures of a star forming and a non-star-forming globule. Dcld303.8-14.2 and Thumbprint nebula", Astronomy & Astrophysics 463, 1029

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	0	0	0
Assoc. Professor	3.5	1	4.5
Assist. Professor	0	0	0
Post-doc	0	0	0

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	2	0	2
Ph.D.	1	0	1

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (DNSRC)
Carlsberg Foundation
Nordic Optical Telescope Scientific Association

6. Three important collaborative research contracts/grants (Inter- & national)

European Union: OPTICON (I3) and ASTRONET (ERA-Net), grants 2004-2010, ~4 MDKK
Villum Kann Rasmussen Foundation (SONG project) 2008-11 (~10 MDKK)
DNSRC: 2006-9 (~900 k DKK)

Group:	Centre for Ice and Climate
Department:	Niels Bohr Institute
Group Leader:	Dorthe Dahl-Jensen, Professor, 35 32 05 56, ddj@gfy.ku.dk

1. Description of Research Field

The work at the Centre for Ice and Climate / The Ice and Climate Research Group is focused on understanding past, present, and future climate based on data obtained from drilling and analysis of deep ice cores in Central Greenland and Antarctica. The group is in charge of Greenland deep drilling operations performed within a broad international framework. The group runs several ice core analysis labs and interprets the results to increase understanding of the dynamics of past climate and to improve the modeling of future climate and the fate of the Greenland ice cap.

2. Five newer representative publications

- Vinther, BM; Buchardt, SL; Clausen, HB; Dahl-Jensen, D; Johnsen, SJ; Fisher, DA; Koerner, RM; Raynaud, D; Lipenkov, V; Andersen, KK; Blunier, T; Rasmussen, SO; Steffensen, JP; Svensson, AM: Holocene thinning of the Greenland ice sheet, **NATURE**, 461 (7262): 385-388
- Jones, PD; Briffa, KR; Osborn, TJ; Lough, JM; van Ommen, TD; Vinther, BM; Lutherbacher, J; Wahl, ER; Zwiers, FW; Mann, ME; Schmidt, GA; Ammann, CM; Buckley, BM; Cobb, KM; Esper, J; Goosse, H; Graham, N; Jansen, E; Kiefer, T; Kull, C; Kuttel, M; Mosley-Thompson, E; Overpeck, JT; Riedwyl, N; Schulz, M; Tudhope, AW; Villalba, R; Wanner, H; Wolff, E; Xoplaki, E: High-resolution palaeoclimatology of the last millennium: a review of current status and future prospects, **HOLOCENE**, 19 (1): 3-49
- Langen, PL; Vinther, BM: Response in atmospheric circulation and sources of Greenland precipitation to glacial boundary conditions, **CLIMATE DYNAMICS**, 32 (7-8): 1035-1054
- Lambert, F; Delmonte, B; Petit, JR; Bigler, M; Kaufmann, PR; Hutterli, MA; Stocker, TF; Ruth, U; Steffensen, JP; Maggi, V: Dust-climate couplings over the past 800,000 years from the EPICA Dome C ice core, **NATURE**, 452 (7187): 616-619
- Steffensen, JP; Andersen, KK; Bigler, M; Clausen, HB; Dahl-Jensen, D; Fischer, H; Goto-Azuma, K; Hansson, M; Johnsen, SJ; Jouzel, J; Masson-Delmotte, V; Popp, T; Rasmussen, SO; Rothlisberger, R; Ruth, U; Stauffer, B; Siggaard-Andersen, ML; Sveinbjornsdottir, AE; Svensson, A; White, JWC: High-resolution Greenland Ice Core data show abrupt climate change happens in few years, **SCIENCE**, 321 (5889): 680-684

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	1	2
Assoc. Professor	4	1.2	5.2
Assist. Professor	1	4	5
Post-doc	0	6	6

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	4	0	0
Ph.D.	2	13	15

5. Three important external sources of income/grants (Funding bodies)

The Danish National Research Foundation
The Danish Agency for Science, Technology and Innovation
EU FP7

6. Three important collaborative research contracts/grants (Inter- & national)

EU FP7 Ice2Sea; EU FP6 Marie Curie NICE; EU FP7 Marie Curie INTRAMIF
NEEM (Danish contribution from the Danish Agency for Science, Technology and Innovation)

Group:	Dark Cosmology Centre
Department:	Niels Bohr Institute
Group Leader:	Jens Hjorth, Professor, 35 32 59 28, jens@dark-cosmology.dk

1. Description of Research Field

The Dark Cosmology Centre (DARK) focuses on the 'dark Universe': what is dark matter and dark energy, when did stars and black holes form and what is the role of cosmic dust? The existence of dark matter is inferred through its gravitational effects on ordinary, visible matter. The existence of dark energy is inferred from its effect on the expansion of the Universe. DARK's goal is to attain a coherent understanding of the dark Universe through detailed investigations of "cosmic lighthouses", such as gamma-ray bursts, quasars and supernovae, in a unified observational and theoretical framework.

2. Five newer representative publications

- Justyn Maund & Stephen Smartt, "The disappearance of the progenitors of supernovae 1993J and 2003gd", *Science* **324**, 486 (2009).
- Nial Tanvir *et al.*, "A γ-ray burst at a redshift of z~8.2", *Nature* **461**, 1254 (2009).
- Steen Hansen, "Might we eventually understand the origin of the dark matter velocity anisotropy?", *Astrophysical Journal* **694**, 1250 (2009).
- Danuta Paraficz & Jens Hjorth, "Gravitational lenses as cosmic rulers: Ω_m, Ω_Λ from time delays and velocity dispersions", *Astronomy & Astrophysics* **507**, L49 (2009).
- Johan P. U. Fynbo *et al.*, "Low-resolution spectroscopy of gamma-ray burst optical afterglows: biases in the *Swift* sample and characterization of the absorbers", *Astrophysical Journal (Supplement Series)* **185**, 526 (2009).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	5.2	7.2
Assist. Professor	0	0.2	0.2
Post-doc	0	7	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	6	0	6
Ph.D.	3.3	5.7	9

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
Lundbeck Foundation
European Union: FP7 Marie Curie Fellowships

6. Three important collaborative research contracts/grants (Inter- & national)

UltraVISTA – 5-year collaborative survey involving 70 scientists, co-led by DARK
X-shooter – A new instrument for the Very Large Telescope, consortium of 5 countries
Brahe Program – Joint fellowship and visiting professor program with major foreign research institutes.

Group:	Biocomplexity
Department:	Niels Bohr Institute
Group Leader:	Mogens Høgh Jensen, Professor, 35 32 53 72, mhjensen@nbi.dk

1. Description of Research Field

The group has research efforts in a large variety of fields within modern biophysics and more classical complex systems. A main topic is dynamical genetic networks, protein networks and gene regulation where we formulate equations and algorithms for the regulatory networks and compare to experiments. On the experimental side focus is on single molecule investigations (using optical tweezers), in particular on central biological molecules relating to translation and transcription. Another central topic is thermodynamics of membranes, especially with relation to nerve impulse propagation and action of anesthesia. In classical complex systems the main topics are: sono-luminescence, turbulence, fracture and fragmentation, fractals, granular materials and econophysics.

2. Five newer representative publications

- S. Maslov, S. Krishna, T. Y. Pang, and K. Sneppen, "Toolbox model of evolution of prokaryotic metabolic networks and their Regulation", Proc. Nat. Acad. Sci. 106:9743-9748 (2009).
- N. Mitarai, J.-A. M. Benjamin, S. Krishna, S. Semsey, Z. Csiszovszki, E. Masse, and K. Sneppen, "Dynamic features of gene expression control by small regulatory RNAs", Proc. Natl. Acad. Sci. 106:10655 (2009)
- T. Winther, L. Xu, K. Berg-Sørensen, S. Brown, and L.B. Oddershede, "Effect of energy metabolism on protein motility in bacterial outer membranes", Biophys. Journ. 97, 1 (2009)
- M.H. Jensen, S. Krishna and S. Pigolotti, "The Repressor-Lattice: Feedback, Commensurability, and Dynamical Frustration", Phys.Rev.Lett. 103, 118101 (2009).
- Blicher, K. Wodzinska, M. Fidorra, M. Winterhalter and T. Heimburg. „The temperature dependence of lipid membrane permeability, its quantized nature, and the influence of anesthetics", Biophys. Journ. 96: 4581-4591 (2009).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	6	0	6
Assist. Professor	0	3	3
Post-doc	1	8	9

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	30	2	32
Ph.D.	16	1	17

5. Three important external sources of income/grants (Funding bodies)

VILLUM KANN RASMUSSEN Foundation
Danish National Research Foundation
Danish Natural Science Research Council (FNU)
Copenhagen University Excellence Program

6. Three important collaborative research contracts/grants (Inter- & national)

Danish Center for Biophysics – BioNET (2004-2009), collaboration between KU, SDU and AU.
Center for Models of Life collabs.: NIH, Harvard University, University of Budapest, University of Adeleide.
The Excellence program collabs.: Harvard University, Vrije Universitet, Amsterdam, IASBS, Iran.

Group:	Computational Astrophysics
Department:	Niels Bohr Institute
Group Leader:	Åke Nordlund, Professor, 35 32 59 68/21 45 49 83, aake@nbi.dk

1. Description of Research Field

Computer simulations, supporting theoretical investigations and comparisons with observations in astrophysics. Topics: star formation, planet formation, solar physics, gamma-ray bursts, jets, accretion disks. Hall mark/specialty is to make direct, forward comparisons of models with observations, using realistic equations of state, magnetic fields, radiative energy transfer processes and spectral diagnostics. The group participates in the recently DNRF-funded Centre for Star and Planet Formation and in the PLANET & SONG micro-lensing planet detection projects.

2. Five newer representative publications

- Gustafsson B., Edvardsson B., Eriksson K., Jørgensen U. G., Nordlund Å., Plez B. 2008, Astronomy and Astrophysics 486, 951
- Lunttila T., Padoan P., Juvela M., Nordlund Å. 2009, Astrophysical Journal 702, L37
- Moreno-Insertis F., Galsgaard K., Ugarte-Urra I. 2008, Astrophysical Journal 673, L211
- Nordlund Å., Stein R. F., Asplund M. 2009, Living Reviews in Solar Physics 6, 2
- Southworth J. et al. 2009, Monthly Notices of the Royal Astronomical Society 399, 287

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	1	0	1
Assoc. Professor	2	¼	2,25
Assist. Professor	0	0	0
Post-doc	0	2	2

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	3	0	3
Ph.D.	2	1	3

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
Danish Natural Science Research Council
DCSC (Danish Center for Scientific Computing)

6. Three important collaborative research contracts/grants (Inter- & national)

STARPLAN (Center for Star and Planet Formation): Danish National Research Foundation funded center (PI: Martin Bizzarro).
SOLAIRE: EU FP6 network with 12 other European nodes, funds 2 PhD students at NBI and networking activities, schools and meetings.
SONG: International collaboration constructing a worldwide network of telescopes for the detection of extra-solar planets and for detecting stellar oscillations.

Group:	Nano Physics
Department:	Niels Bohr Institute
Group Leader:	Jesper Nygård, Associate Professor, 35 32 04 86, nygard@nbi.dk

1. Description of Research Field
Topics within condensed matter, solid state and nano physics, both theory and experiments. Quantum information technology, superconductivity, mesoscopic systems, electron transport, molecular devices, magnetism, thermodynamics, growth of semiconductors, structural characterization of nanostructures using electron microscopy, synchrotron x-rays and neutrons. An integral part of the Nano-Science Center incl. its University of Copenhagen Center of Excellence and the UNIK project Synthetic Biology. Hosts the Center for Molecular Movies (Danish National Research Foundation). Key player in the future European Spallation Source (ESS, Lund).

2. Five newer representative publications
- K. Kaasbjerg and K. Flensberg, Strong Polarization-Induced Reduction of Addition Energies in Single-Molecule Nanojunctions, Nano Lett. 8, 3809 (2008).
- C. Bahl et al., Uniform spin wave modes in antiferromagnetic nanoparticles with uncompensated moments, Europ. Phys. J. 62, 53 (2008).
- J.R. Hauptmann et al., Electric-field controlled spin reversal in a quantum dot with ferromagnetic contact, Nature Physics 4, 373 (2008).
- J. Jensen and M. Rotter, Magnetic double-q ordering of tetragonal GdNi2B2C: A way to explain the magnetoelastic paradox, Phys Rev. B 77, 134408 (2008).
- D.W. Breiby et al., Simulating X-ray Diffraction of Textured Films, J. Appl. Cryst, 41, 262-271 (2008).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	2	1	3
Assoc. Professor	7	0	7
Assist. Professor	0	2	2
Post-doc	0	approx. 15	15

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	approx. 20	0	20
Ph.D.	approx. 10	3	13

5. Three important external sources of income/grants (Funding bodies)
Danish Natural Science Research Council, Danish Research Council for Technology and Production Science
Danish National Research Foundation
European Union

6. Three important collaborative research contracts/grants (Inter- & national)
Nano-Science Center including University of Copenhagen Excellence Programme and UNIK Synthetic Biology
Danish National Advanced Technology Foundation
Infrastructure funding (European XFEL project)

Group:	Theoretical Particle Physics and Cosmology
Department:	Niels Bohr Institute
Group Leader:	Niels Obers, Associate Professor, 35 32 52 11, obers@nbi.dk

1. Description of Research Field

The group is involved in a wide scope of research activities centered around quantum theories of gauge fields, gravity and astrophysics. Research areas include the Standard Model, Quantum Chromodynamics, Lattice Simulations, Cosmology, Physics of Cosmic Microwave Background, Black Holes, Matrix Theory and String Theory. More specific research topics include gauge/gravity duality, integrability and spin-chains, phases of black holes in higher dimensions, dynamical triangulations, QCD with imaginary chemical potential and analysis of CMB.

2. Five newer representative publications

- J. Ambjorn, A. Gorlich, J. Jurkiewicz and R. Loll, Planckian Birth of the Quantum de Sitter Universe, Phys. Rev. Lett. 100 (2008) 091304 [arXiv:0712.2485 [hep-th]].
- N.E.J. Bjerrum-Bohr, P.H. Damgaard, P. Vanhove, Minimal Basis for Gauge Theory Amplitudes, Phys.Rev.Lett.103:161602, 2009 [arXiv:0907.1425 [hep-th]].
- C. Kristjansen, M. Orselli, K. Zoubos, Non-planar ABJM Theory and Integrability, JHEP 0903:037, 2009. [arXiv:0811.2150 [hep-th]].
- H.B. Nielsen and C. Frogatt, Remarkable coincidence for the top Yukawa coupling and an approximately massless bound state, Phys.Rev.D80:034033, 2009 [arXiv:0811.2089 [hep-th]].
- R. Emparan, T. Harmark, V. Niarchos and N.A. Obers, World-volume Effective Theory for Higher-Dimensional black holes, Phys. Rev. Let. 102 (2009) 191301 [arXiv:0902.0427 [hep-th]].

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	1	4
Assoc. Professor	5	0	5
Assist. Professor	0	3	3
Post-doc	3	4	7

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	6	0	6
Ph.D.	4	2	6

5. Three important external sources of income/grants (Funding bodies)

Danish Natural Science Research Council (DNSRC)
Carlsberg Foundation
Japanese Society for the Promotion of Science (JSPS)
DG Center grant for DISCOVERY, center for particle physics

6. Three important collaborative research contracts/grants (Inter- & national)

EU Research Training Network ENRAGE
(Random Geometry and Random Matrices: From Quantum Gravity to Econophysics)
Geometry and Mathematical Physics School (GEOMAPS)

Group:	Quantum Optics and Ultra-Cold Atoms
Department:	Niels Bohr Institute
Group Leader:	Eugene Polzik, Professor, 35 32 54 24, polzik@nbi.dk

1. Description of Research Field

Ultra cold atoms, Quantum optics and quantum information science, experiment and theory. In particular, development of the quantum interface between light and matter, including ultracold degenerate gases and solid state systems. Improved accuracy of atom clocks using spin squeezing or alkaline earth atoms. Quantum nanomechanics. Many-body theory and quantum information and communication theory. Novel fiber laser sources. Theory of ultra cold atoms.

2. Five newer representative publications

- Quantum teleportation between light and matter. J. F. Sherson, H. Krauter, R. K. Olsson, B. Julsgaard, K. Hammerer, I. Cirac, and E. S. Polzik, Nature **443**, 557 (2006).
- Quantum computation and quantum-state engineering driven by dissipation, Frank Verstraete, Michael M. Wolf, J. Ignacio Cirac, Nature Physics **5**, 633-636 (2009).
- Bose-Einstein Condensation in Dilute Gases, C. J. Pethick and H. Smith, Second Ed., Cambridge U. P. (2008), pp. 576
- Mesoscopic atomic entanglement for precision measurements beyond the standard quantum limit, J. Appel, P. J. Windpassinger, D. Oblak, U. B. Hoff, N. Kjærgaard and E. S. Polzik, PNAS - Proceedings of the National Academy of Science, **106**, 10960 (2009)
- Sr Lattice Clock at 1 x 10-16 Fractional Uncertainty by Remote Optical Evaluation with a Ca Clock. A. D. Ludlow, T. Zelevinsky, G. K. Campbell, S. Blatt, M. M. Boyd, M. H. G. de Miranda, M. J. Martin, J. W. Thomsen, S. M. Foreman, Jun Ye, *et al* Science **319**, 1805 (2008).

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	3	1	4
Assoc. Professor	3	0	3
Assist. Professor	0	1	1
Post-doc	0	8	8

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	9	0	9
Ph.D.	6	6	12

5. Three important external sources of income/grants (Funding bodies)

Danish National Research Foundation
Danish Natural Science Research Council
European Union, Future and Emerging Technologies Division

6. Three important collaborative research contracts/grants (Inter- & national)

QUANTOP – Danish Quantum Optics Center, collaborative project between NBI and University of Aarhus, Director – E. Polzik
European projects: Hideas - High Dimensional Entangled Systems, Emali - Engineering, Manipulation and Characterization of Quantum States of Matter and Light

Group:	Earth and Planetary Physics
Department:	Niels Bohr Institute
Group Leader:	Carl Christian Tscherning, Professor, 35 32 05 82, cct@gfy.ku.dk

1. Description of Research Field

Geodesy: Shape and Gravity field of the Earth and Planets, Oceanography:
Physical processes and constitution of the ocean, Meteorology: Dynamic and physics of the atmosphere and climate, including models and numerical methods, Theoretical geophysics:
Modelling and simulation of processes and constitution of the Earth and Planets, Planetary research:
Mars surface constitution and properties. Magnetic field measurement and modelling.

2. Five newer representative publications

- Camilla W. Stjern, Jón Egill Kristitjánsson and Aksel Walløe Hansen "Global dimming and global brightening – an analysis of surface radiation and cloud cover data in northern Europe", Int. J. CLIMATOLOGY2008, DOI: 10.1002/joc.1735
- Sadiq, Muhammad, C.C. Tscherning and Zulfiqar, Ahmad: An estimatetion of the height system bias parameter No using Least Squares Collocation from observed gravity and GPS/leveling data. StudiaGG, Vol. 53, pp. 375-388, 2009
- 79] W. Goetz, S.F. Hviid, K.M. Kinch, M.B. Madsen (2008), Magnetic Properties Results from Surface Landers and Rovers, pp.366-381, in: J.F. Bell III (ed.), "The Martian Surface: Composition, Mineralogy and Physical Properties", *Cambridge University Press* (2008), ISBN 978-0-521-86698-9
- [86] H. P. Gunnlaugsson, H. Rasmussen, M. B. Madsen, P. Nørnberg (2009), New analysis of the Mössbauer Spectra of Olivine Basalt rocks from Gusev Crater on Mars, *Planetary and Space Science* **57**, 640–645.
- Hansen, T. M., Mosegaard, K., Pedersen-Tatalovic, R., Uldall, A., and Jacobsen, N.L. 2008. Attribute guided well log interpolation. Geophysics, 73(6), R83-R95. doi:10.1190/1.2996302

3. Staff (Number of full-time equivalents, primary group members)

Positions	Internally funded (ordinary)	Externally funded	Total
Professor	4	0	4
Assoc. Professor	2	1	3
Assist. Professor	0	1	1
Post-doc	0	4	4

4. Graduate students (Number currently enrolled)

Type	Internal	External	Total
M.Sc.	10	0	10
Ph.D.	4	6	10

5. Three important external sources of income/grants (Funding bodies)

European Space Agency, ESA
The Danish Council for Independent Research - Technology and Production Sciences
The Danish Council for Strategic Research

6. Three important collaborative research contracts/grants (Inter- & national)

ESA-GOCE
Center for Energy, Environment and Health
NASA-JPL/Caltech (+Cornell: MERSS and Uni. Arizona: Phoenix)

Scientific staff at the Faculty of Science
November 2009

Department	Professor	Assoc. Professor	Assist. Professor	Post doc	PhD	Total
Biology	30	104	7	85	110	**336**
Chemistry	9	31	2	43	68	**153**
Computer Science	6	19	8	9	41	**83**
Exercise and Sport Sciences	9	23	2	9	26	**69**
Geography and Geology	14	44	3	25	45	**131**
Mathematical Sciences	15	24	2	19	19	**79**
Natural History Museum of Denmark	11	39	0	21	19	**90**
Niels Bohr Institute	28	64	3	92	86	**273**
Science Education	1	4	0	1	4	**10**
Total	**123**	**352**	**27**	**304**	**418**	**1224**

About the Faculty of Science

The Faculty of Science carries out research and education in multiple disciplines such as biology, chemistry, physics, geography, geology, sport sciences, and mathematics, as well as interdisciplinary fields such as polar science, space science, earth system science, nanotechnology, didactics of science, and computer science.

SCIENCE consists of 9 departments including the Natural History Museum of Denmark. The Faculty hosts two inter-faculty centers, *the Nano-Science Center* and *the eScience Center* and 13 National Research Foundation Centers of Excellence.

With more than 6,000 students and more than 2,000 employees, it is Denmark's largest natural science research and education institution.

The Faculty has more than 1,200 researchers, including more than 500 PhD students, as of November 2009. It offers 13 B.Sc., 17 M.Sc. and 1 Master program.

This publication provides an overview of research groups at the Faculty as of November 2009.

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