



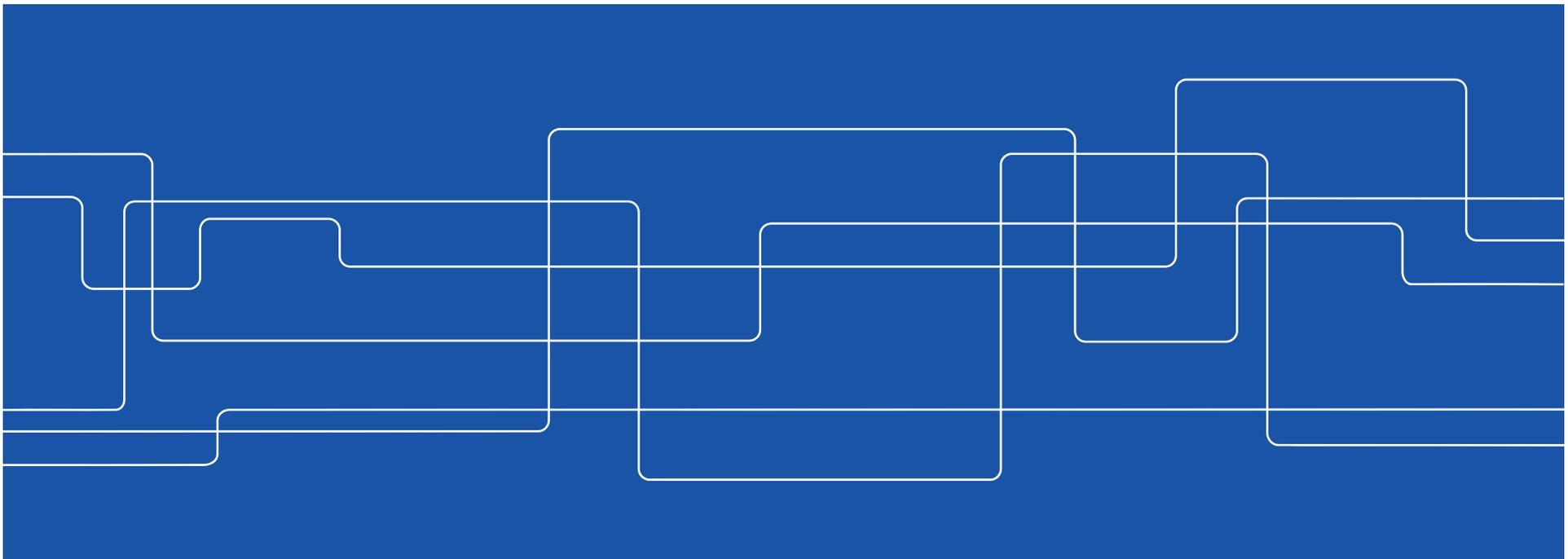
# KTH Royal Institute of Technology

## Research at KTH

Leif Kari

Dean School of Engineering Sciences

10 March 2015





# Sweden's leading university of technology

- Sweden's oldest and largest university of technology.
- More than 12,000 full-time (equivalents) students.
- More than 1,800 PhD students.
- Over 4,800 employees.
- Ranked as the 126th best university in the world by THE
- Ranked as the 30th best univ. of technology in the world by THE



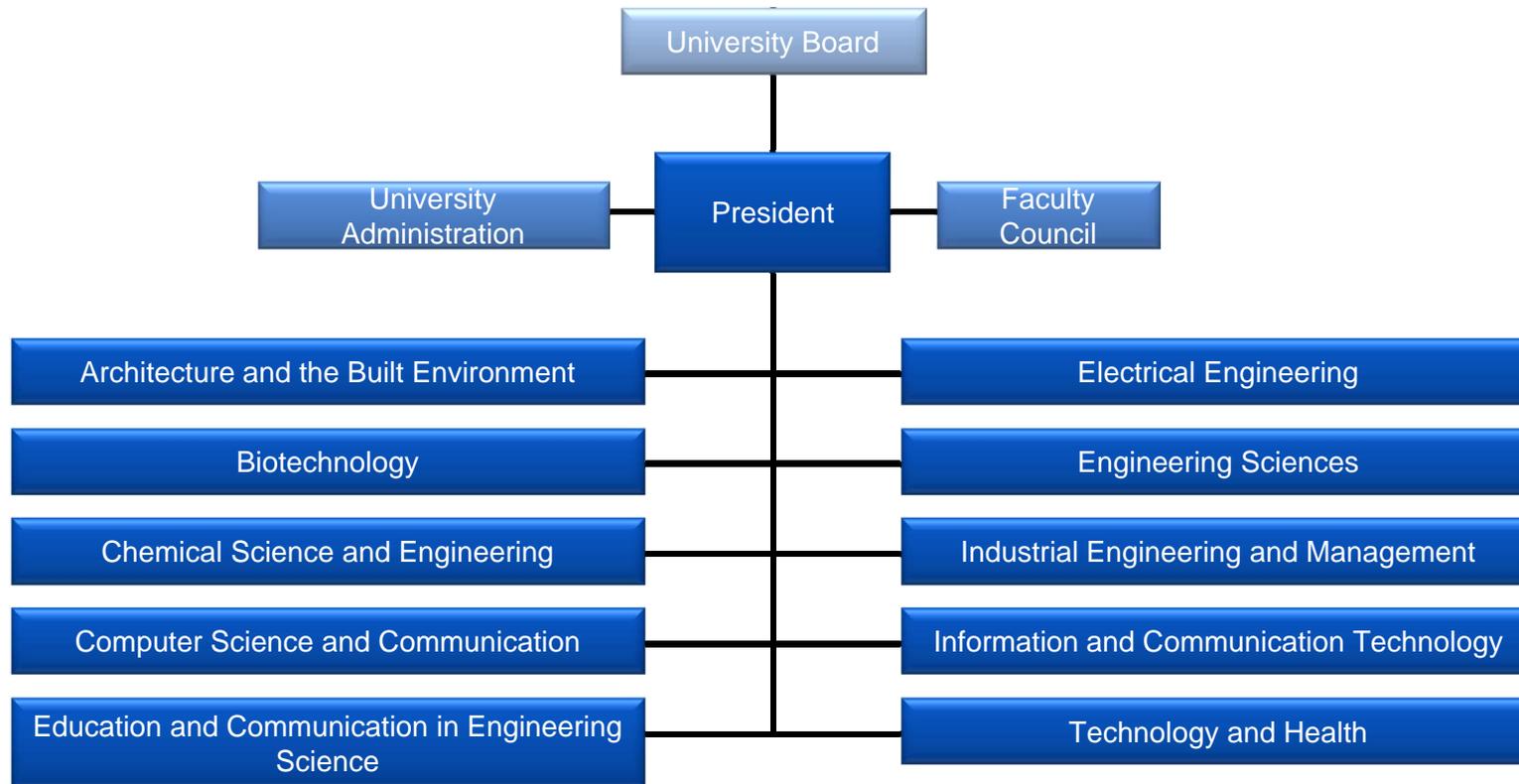


# President Obama visits KTH September 4th 2013



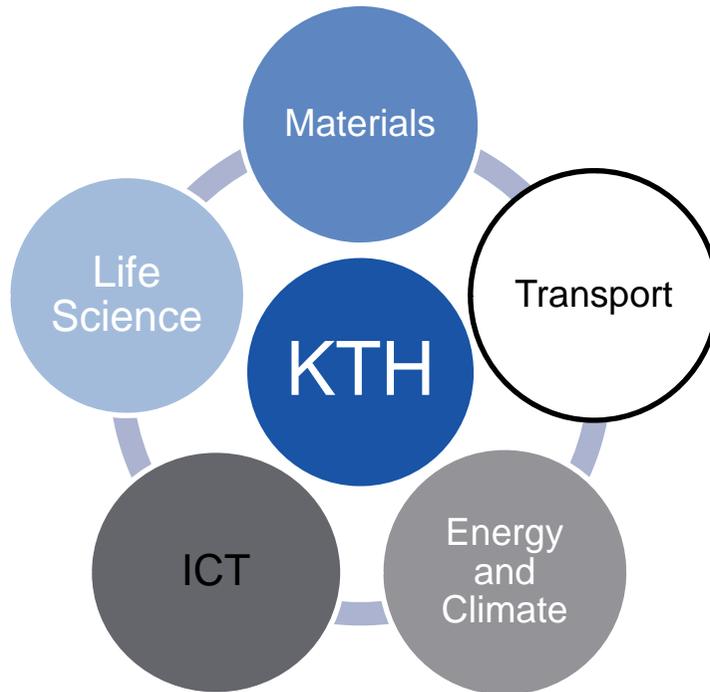


# KTH's organisation





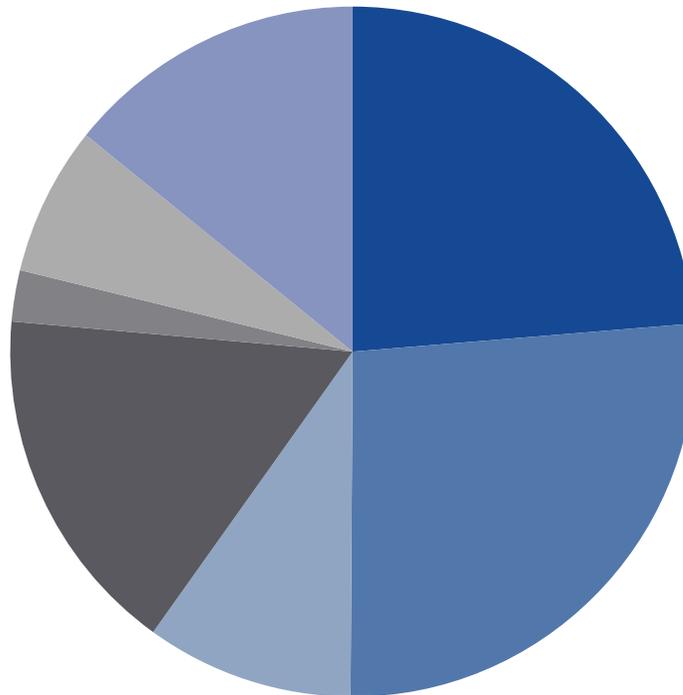
# KTH research platforms





# Sources of income 2013

Income total MSEK 4,038 = M\$484



- Level 1 and level 2 education 23.7% (26%)
- Research and doctoral studies grants 26.4% (25%)
- Research Councils 9.8% (9.6%)
- Other government agencies 16.5% (15.7%)
- Strategic foundations 2.4% (2.3%)
- EU 7% (7.4%)
- Other private sources/companies 14.2% (14%)





# KTH - An international university

International KTH faculty and researchers

Worldwide student exchange

International students (degree-seeking)

International collaboration

- CLUSTER
- 4 KICs
- China Centres of Excellence
- INSPIRE Illinois
  
- Students, staff and alumni from more than 100 countries
- International collaboration initiatives...





## Collaboration with society

### Strategic partnerships

Long-term dialogue on executive level

Short-term goals for education and research



SKANSKA



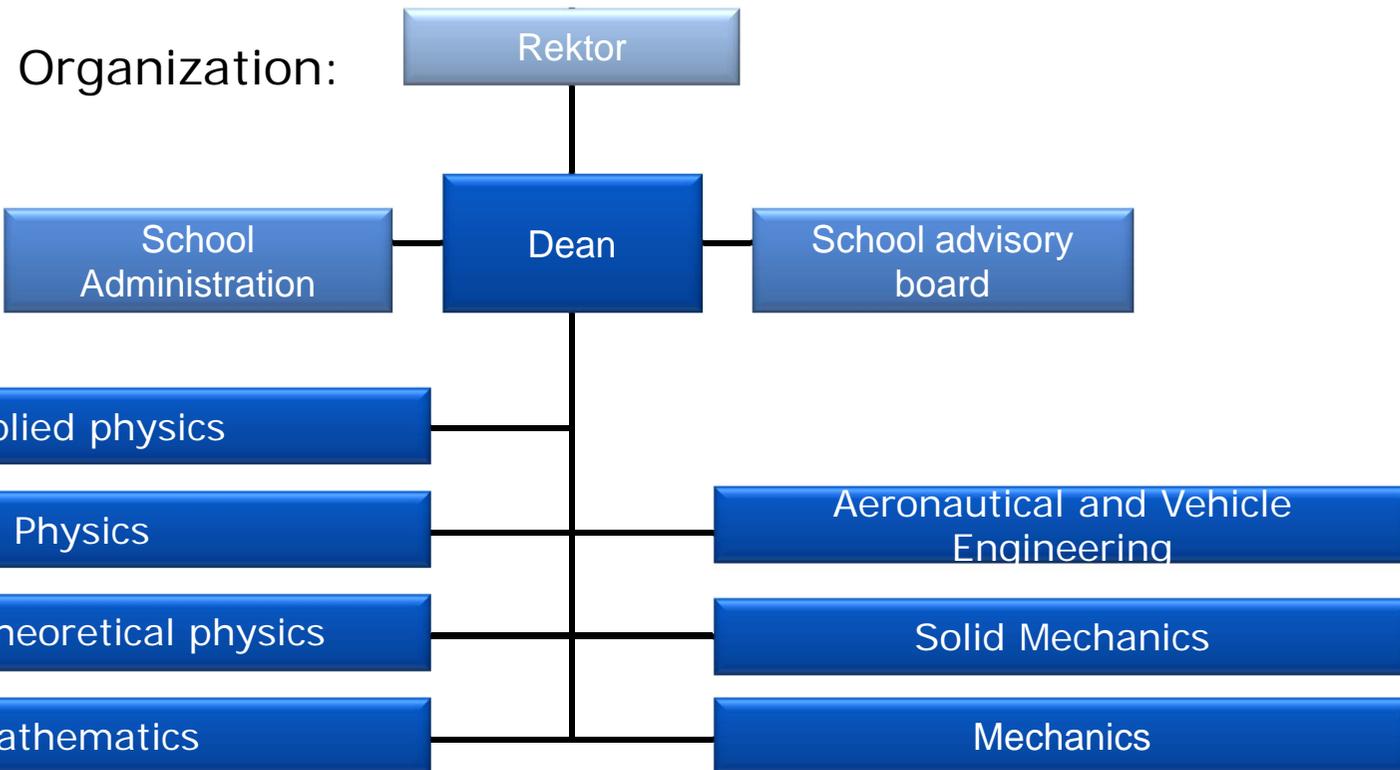
### Mobility

Adjoint professors, affiliated faculty, industry PhD students

Adjoint experts, affiliated experts



# School of Engineering Sciences





# Department of Theoretical Physics

Particle and mathematical  
physics

Condensed matter  
physics

Biophysics



Olle Edholm



Alexander Balatsky



Anders Rosengren



Tommy Ohlsson



Erik Lindahl



Patrik Henelius



Mats Wallin



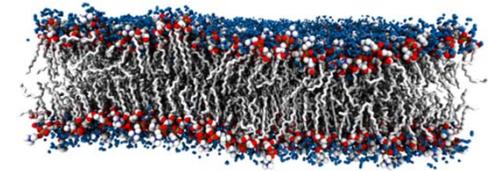
Edwin Langmann



# Department of Theoretical physics

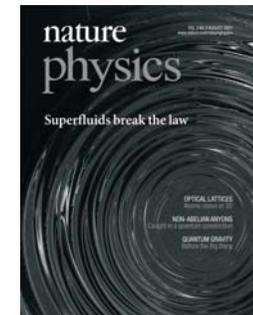
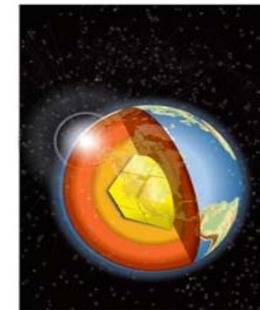
## BIOPHYSICS

- Membrane and membrane protein modeling
- Bioinformatics and structure prediction
- In silico drug design
- Molecular simulation(GROMACS, Folding at home)
- Soft condensed matter



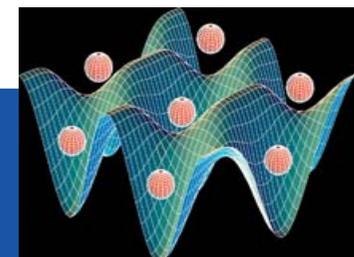
## CONDENSED MATTER PHYSICS

- New types of superconductivity
- Materials at high T and P. Structure of the earth core
- Copper corrosion and nuclear waste disposal
- Spin models
- Disordered systems, Dirac materials



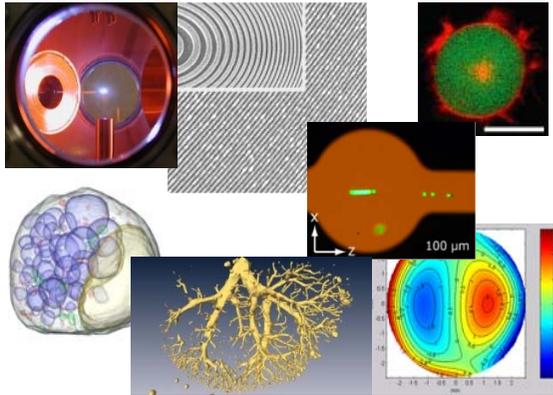
## PARTICLE AND MATHEMATICAL PHYSICS

- Neutrino physics
- Dark matter, extra dimensions
- Exactly solvable models
- 2D correlated Fermion systems
- Quantum field theory; Open quantum systems



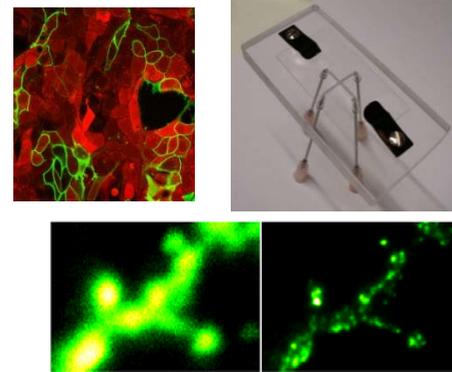


# Applied Physics: Bio-Opto-Nano & Teaching



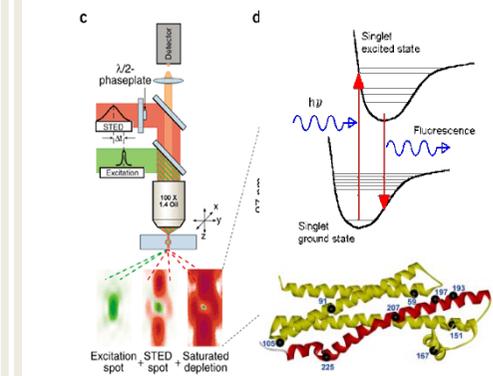
**Biomedical & X-Ray Physics (28 p)**

X-rays (sources, microscopy, imaging),  
ultrasonics, cell biology, visual optics



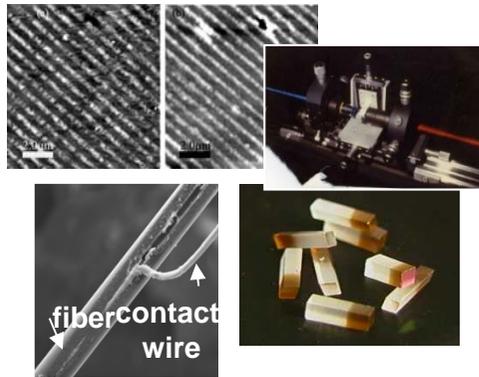
**Cell Physics (19 p)**

Microscopy, protein interaction, cell  
biology, modeling, immunology



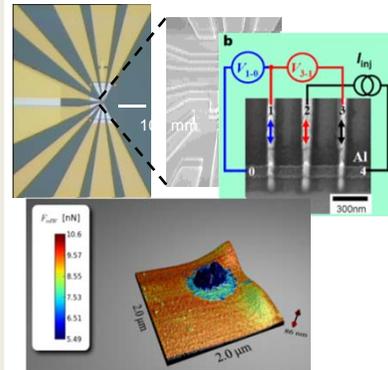
**Biomolecular Physics (11 p)**

Single molecules, fluorescence,  
microscopy



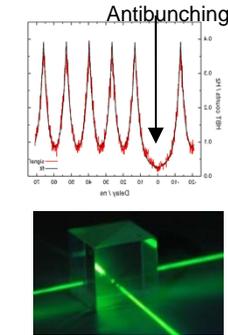
**Laser Physics (22 p)**

Optical materials, non-linear optics,  
functional light sources



**Nanostruct. Physics (9 p)**

Quantum circuits, spintronics, nano-  
bio surfaces, AFM



**Quantum  
Electr./Opt. (8 p)**

Quantum information,  
quantum mech.



**Undergr. Teaching**

Electromagn. & waves,  
bio- opto- nano- courses...



# APHYS Integrated Laboratory Environment

## 100 users, 1200 m<sup>2</sup>

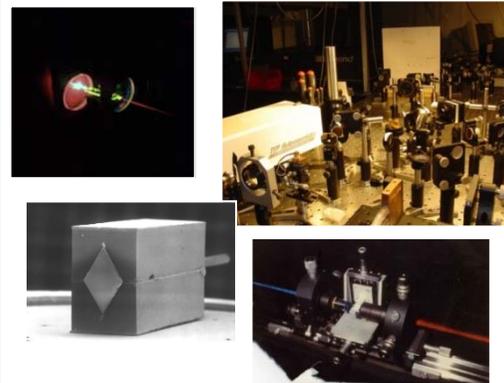
Core facilities (500 m<sup>2</sup>)

Specialized labs (700 m<sup>2</sup>)

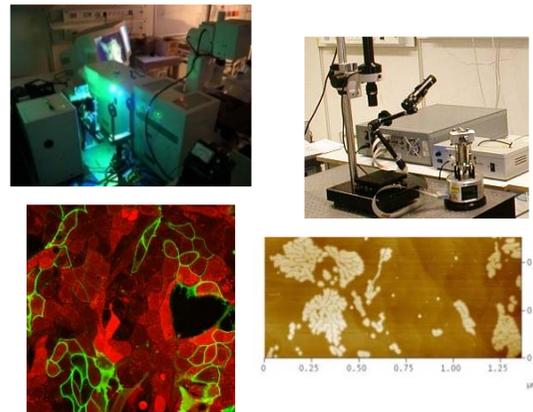
### Nanofabrication



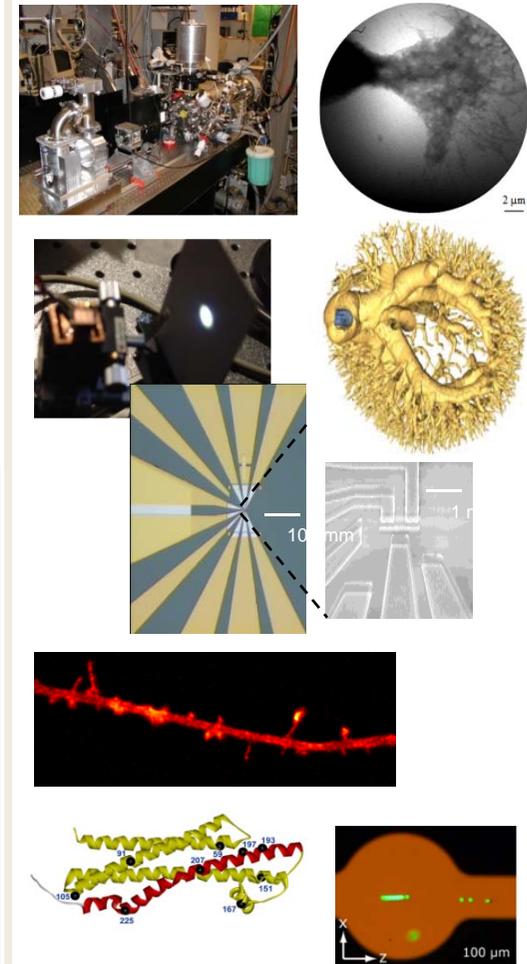
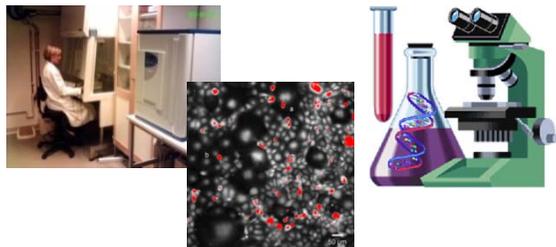
### Laser- and Non-Linear Optics



### Bioimaging



### Molec. & Cell Biology





# Department of Physics

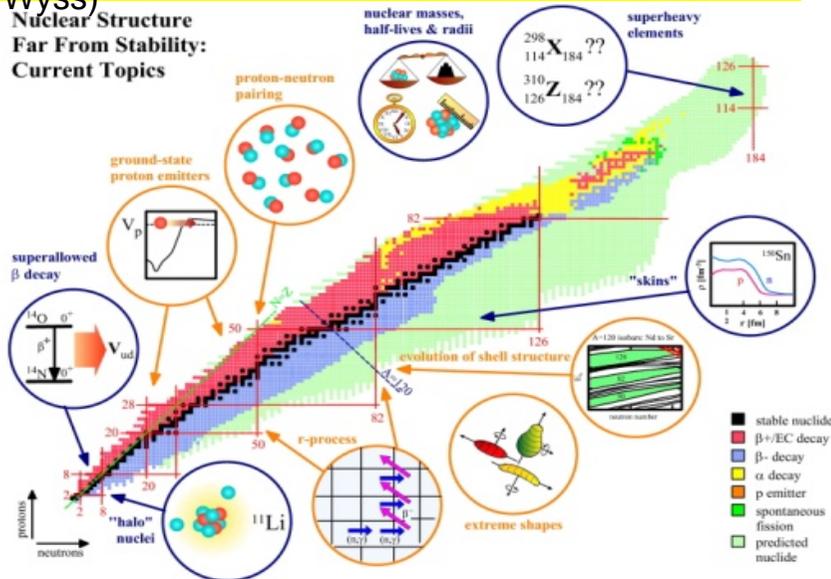


Head of Department: **Mark Pearce**

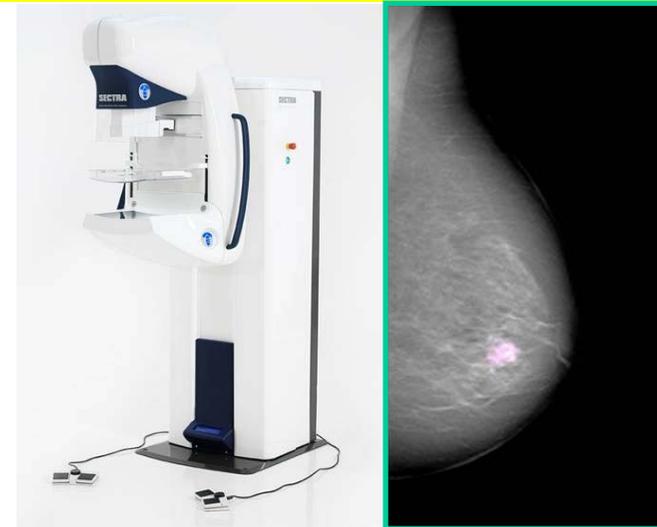


**Nuclear physics:** Nuclear structure studies at the limits of existence (experiment and theory). Preparations for FAIR facility. (Prof. B. Cederwall, Prof. R. Wyss)

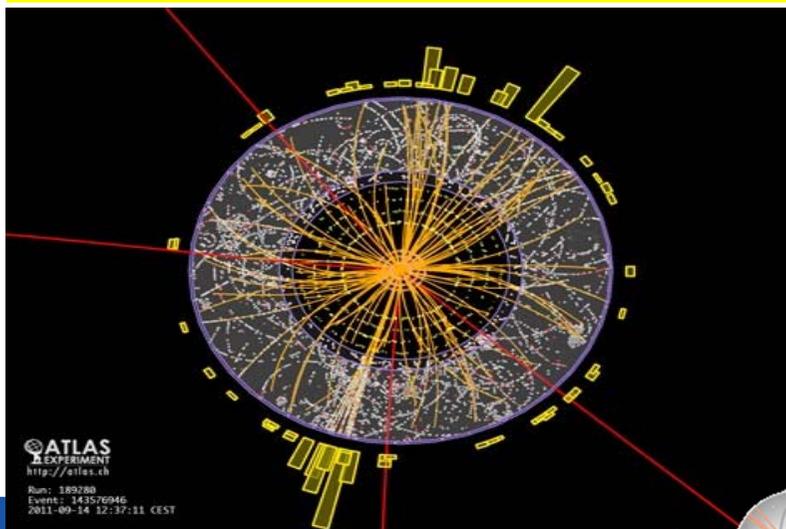
**Nuclear Structure Far From Stability: Current Topics**



**Physics of medical imaging:** Detector systems for better images and lower radiation doses. (Prof. M. Danielsson).



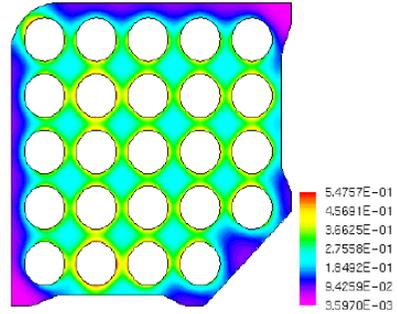
**Particle physics:** ATLAS experiment at LHC. Higgs and supersymmetry. (Prof. B. Lund-Jensen)



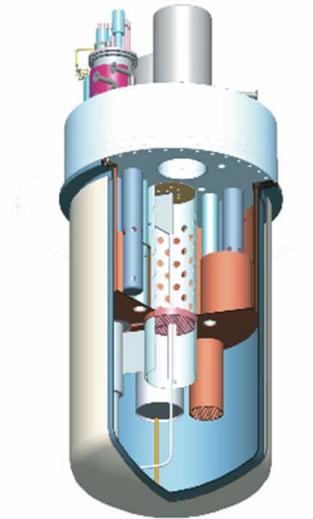
**Astroparticle physics:** Cosmic antimatter and (polarised) X-/gamma-rays. Balloon and satellite-borne instruments. (Prof. M. Pearce)



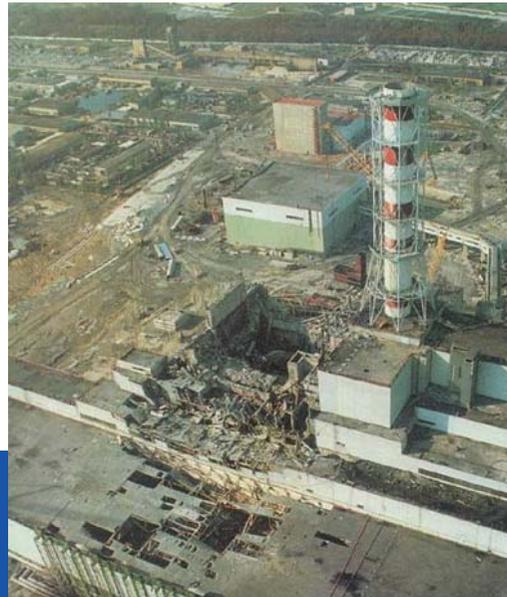
**Reactor technology:** Computational (CFD) and experimental reactor thermal-hydraulics and neutronics. (Prof. H. Anglart)



**Reactor physics:** Generation IV reactors for transmutation of nuclear waste. (Prof. J. Wallenius, Prof. W. Gudowski)



**Nuclear Power Safety:** reactor/plant safety design and analysis, experimental studies, multiscale modelling. (Prof. S. Bechta)





# Nobel Prize in Physics 2013



