PhD and post-doctoral positions in Computational Nanoscience

Several PhD and post-doctoral positions are available in the Centre of Excellence for Computational Nanoscience (COMP) at Aalto University School of Science, Helsinki, Finland (www.aalto.fi). COMP was selected as an Academy of Finland Centre of Excellence originally from 2000 - 2005, and again from 2006 – 2011 and 2012 – 2017. This award emphasizes the scientific excellence of COMP and its global reputation for computational physics. The centre is led by Professor Risto Nieminen, and consists of over 80 researchers, forming eight focused research groups. Projects are available in all of COMP’s subgroups, and candidates are encouraged to explore the online group descriptions (http://tfy.tkk.fi/comp) or contact subgroup leaders directly for more specific information:

- Complex Systems and Materials (CSM) - Mikko Alava
- Electronic Properties of Materials (EPM) - Martti Puska
- Physical Chemistry (CHE) - Kari Laasonen
- Quantum Computing and Devices (QCD) - Mikko Möttönen
- Quantum Dynamics (QD) - Päivi Törmä
- Quantum Many-body Physics (QMP) - Ari Harju
- Multiscale Statistical Physics (MSP) - Tapio Ala-Nissilä
- Surfaces and Interfaces at the Nanoscale (SIN) - Adam Foster

COMP’s research strategy is based on the development and application of advanced theoretical and computational methods for condensed-matter and materials physics and chemistry, especially in nanosciences and nanotechnology. COMP has extensive international collaboration networks, strong contacts to experimental activities, both on-campus as well as internationally, and a very active interface to applied and industrial research in nanotechnology and materials engineering. Its scientific output and impact are excellent, and in the 2009 Research Assessment Exercise of Aalto School of Science, COMP was recognized as having reached an outstanding international level.

TECHNICAL REQUIREMENTS AND DETAILS

Successful candidates shall have or are close to having a MSc or PhD in Physics, Chemistry, Materials Science, Computer Science, Electrical Engineering or related disciplines. Knowledge of computational physics and chemistry software, and programming experience are also desirable. The standard contract periods are 4 years for PhD students and 2 years for post-doctoral researchers, with possibilities for extensions in the latter case. Typical salary ranges (before taxes) at the Aalto School of Science are 2300-2700 €/month for PhD students and 3300-3700 €/month for post-doctoral researchers. Full social benefits are included.

HOW TO APPLY

The call is open and the positions can be filled as soon as proper candidates are found. The deadline for the first round of applications is December 31st 2011. Applications should consist of a scientific CV, publication list, the names of two referees and, for PhD applicants, the transcripts of studies. Please also indicate any particular preferences with respect to research groups. Inquiries and applications should be sent to: compjobs@list.aalto.fi
ADDITIONAL DETAILS OF RESEARCH TOPICS

- **Complex Systems and Materials (CSM)** - Mikko Alava
  
  - Statistical physics applied to a variety of cross-disciplinary topics, ranging from computer science to materials to complexity in human behavior. Experiments on critical and time-dependent behavior in materials.

- **Electronic Properties of Materials (EPM)** - Martti Puska
  
  - Properties of materials, nanostructures and nanodevices using density-functional theory (DFT), including first-principles molecular dynamics, quantum transport, time-dependent extensions, and modern functionals to treat the van der Waals interactions. Kinetic Monte-Carlo (LKMC) simulations and various tight-binding schemes.

- **Physical Chemistry (CHE)**: Kari Laasonen
  
  - Density-functional-theory-based studies of chemical compounds and reactions. Especially reaction on surfaces and reaction in water.

- **Quantum Computing and Devices (QCD)**: Mikko Möttönen
  
  - Theoretical studies of quantum nanoelectronics, Bose-Einstein condensates, quantum information processing (QIP), and decoherence and fluctuations in quantum systems. Experimental studies of low-temperature quantum nanoelectronics: Josephson devices, hybrid normal metal-superconductor circuits, silicon quantum dots and single donors in silicon. Applications in QIP, single-charge pumping, and heatronics.

- **Quantum Dynamics (QD)**: Päivi Törmä
  
  - Theory of quantum many-body physics, especially in the context of ultracold Fermi gases and with emphasis on dynamics. The computational methods used include dynamical mean-field theory, and time-dependent density matrix renormalization group methods in one dimension. Experiments and modelling on nanoplasmonics.

- **Quantum Many-body Physics (QMP)** - Ari Harju
  
  - Theory of strongly correlated quantum systems, such as quantum dots at magnetic field, using many-body approaches, like exact diagonalisation and quantum Monte Carlo. Graphene simulations from atomistic level to mesoscopic transport studies. GPU computing.

- **Multiscale Statistical Physics (MSP)** - Tapio Ala-Nissilä
  
  - Development of multiscale methods: phase-field approaches and multi-phase simulation methods. Application to solid and soft-matter nanostructures, microfluidics, colloids, polymers and nanofluids. Development of methods to speed up MD with applications to polymer translocation and escape from confined geometries. Coarse-grained models for polymer blends. Fluctuation relations in microscopic systems.

- **Surfaces and Interfaces at the Nanoscale (SIN)** - Adam Foster
  
  - Various atomistic and quantum mechanical simulation methods to study surface and interface physics. Topics vary from Scanning Probe Microscopy, nanoscale studies of friction and nanomanipulation to nanocatalysis and nano-electronics.