

2 PhD positions in Theoretical Physics available:

Institute of Physics, University of Freiburg, Germany

Projects:

Cutting-edge research at the interface of physics, chemistry and biology. Both projects are funded by the Germany Science Foundation (DFG). The first appointments will be for three years, starting as soon as possible.

1. Dynamics on Complex Networks:

Recent experiments on light-harvesting systems in photosynthetic units revealed that the dynamics of excitations created by the incoming solar photons cannot be understood on a purely classical basis. Therefore, it has been suggested that the transport process is essentially quantum mechanical in nature. Here, we will model different biological systems by complex networks, which can have vastly different structures. The aim of this work is to identify and understand which topological features of the networks lead to an efficient transport. This might enable us to explain why nature chooses the particular structures we see today.

2. Dynamics, Trapping, and Dissipation of Excitations:

The trapping of excitations is an important aspect in a large variety of physical, chemical, and biological processes. For instance, trapping of excitations can happen in ultra-cold gases (Rydberg gases or Bose-Einstein condensates), chemical reactions, or photosynthesis. The global dynamics of the excitations can be inferred from the particular decay behavior. In this project we start from a quantum mechanical model and aim at understanding how the dynamics is influenced by the (static and/or dynamic) properties of the traps. In a second step we will also couple these systems to an environment to investigate the dissipative dynamics in the presence of traps. In this way we are able to explore the quantum-to-classical crossover.

Requirements:

We seek candidates with a strong affection for Theoretical Physics or Chemistry. In particular experience with Statistical as well as Quantum Mechanics would be advantageous. The successful candidates should have a diploma, master's, or equivalent degree in theoretical physics/chemistry.

Location:

Freiburg is a vibrant town at the foot of the Black Forest close to the Swiss and French border. The Institute of Physics has a strong research record in Complex Systems, in Atomic & Molecular Physics as well as in High Energy Physics. Our group has also close contacts to Theoretical Chemistry and to the School of Soft Matter Research at the Freiburg Institute of Advanced Studies (FRIAS).

If you have further questions, don't hesitate to contact me.

Please send your applications, including a CV with a list of references, as a single PDF-file by email to the address given below.

Contact:

PD Dr. Oliver Mülken, Institute of Physics, University of Freiburg, Germany

Email: muelken@physik.uni-freiburg.de

Phone: +49-761-203-5944

<http://top10.physik.uni-freiburg.de/~muelken/>