

# FIAS

## Call for Junior Fellows and Graduate Students at the Frankfurt Institute for Advanced Studies

The newly founded *Frankfurt Institute for Advanced Studies (FIAS)* at the Johann Wolfgang Goethe University, Frankfurt am Main, invites applications from young scientists of exceptional ability for several open Junior Fellow (Postdoctoral Research) and Graduate Student scholarships.

FIAS is dedicated to fundamental research in the fields of Theoretical Biology, Theoretical Chemistry, Theoretical and Computational Neuroscience, and Theoretical Physics, with an emphasis on the study of the structure and dynamics of complex systems. FIAS strongly encourages interdisciplinary collaboration. It cooperates with the Max Planck Institute for Biophysics, the Max Planck Institute for Brain Research in Frankfurt, the Gesellschaft für Schwerionenforschung (GSI Darmstadt) and various institutes at the Johann Wolfgang Goethe University. Additional information on FIAS can be found at the website <http://www.fias.uni-frankfurt.de>

The Junior Fellows should hold a Ph.D. Candidates having a strong theoretical background and experience with quantitative mathematical and numerical methods (e.g., many-body theory, ab initio calculations and model simulations of complex structures, dynamics of complex classical and quantum systems, Monte Carlo and Molecular Dynamics techniques, large-scale simulations of neural networks) will be preferred.

Applications in the following research areas are especially invited:

**a) Theoretical Biology:** 1) Development of new model concepts in cell biology and systems biology. Application to complex biological systems, with a focus on theoretical immunology (e.g., in silico disease models, cancer research). 2) Theoretical aspects of heavy-ion tumor therapy.

**b) Theoretical Neuroscience:** Modeling of functions related to perception, attention, subsystem integration, sensori-motor coupling and learning. Development of analysis tools based on statistical approaches or classification. AI for the evaluation of high-dimensional time series obtained with parallel recordings. Implementation of brain inspired algorithms in robotic devices. Candidates should have a strong background in computational neuroscience. Experience with experimental approaches is desirable but not obligatory.

**c) Theoretical Chemistry:** Development of new methods in quantum chemistry. Study of fundamental symmetries and their violation. Branching and bifurcation of chemical reactions. Structure and dynamics of complex molecules.

**d) Computational Soft-matter Science:** State-of-the-art modeling of long-range interactions. Theoretical aspects for biological and inorganic charged systems, polyelectrolytes, charged colloids, ferrofluids. Experience with C/mpi and with efficient MD/MC strategies for mesoscopic and atomistic simulations are expected.

**e) Mesoscopic Systems:** Study of nano-clusters (collision and excitation processes, chemical transformations, photo-processes, collective phenomena). Clusters and molecules on surfaces and in thin films.

**f) Computational Membrane Proteomics:** Molecular modeling and microscopic simulations of the dynamics of free and membrane-based protein interaction. On-lattice and off-lattice modeling of protein folding.

**g) Theoretical Heavy-Ion Research:** 1) Development of non-equilibrium transport theory for relativistic heavy-ion physics. Study of phase transitions in strongly interacting matter and their astrophysical implications. 2) Study of complex hadronic systems (exotic nuclei, superheavy elements). Structure of the vacuum in strong fields.

The **Junior Fellows** will conduct research in collaboration with the FIAS Fellows, with scientists from cooperating institutions, and with Ph.D. students. The appointments are for up to three years. A tax-free scholarship of 30.000 EUR per year (equivalent to about 50k US\$ before tax) will be offered.

Exceptionally qualified **students** interested in the above research areas are invited to apply for the three-year interdisciplinary Ph.D. program of the *Frankfurt International Graduate School for Science (FIGSS)*. The students should hold a very good diploma or M.Sc. degree or an exceptional honors B.Sc. They will be supervised by scientists from FIAS and of the faculties of science at Goethe University. All courses will be held in English; a TOEFL certificate is required. A tax-free stipend of 12.000 EUR per year can be offered to successful applicants. For more information see <http://www.fias.uni-frankfurt.de/figss/>

Applicants should arrange for letters of reference to be sent to the address given below. Please send a statement of research interests, a curriculum vitae and a complete list of publications to: **Frankfurt Institute for Advanced Studies, Johann Wolfgang Goethe-University, Robert-Mayer-Str. 10, 60054 Frankfurt am Main/Germany, e-mail: [fias@uni-frankfurt.de](mailto:fias@uni-frankfurt.de) (for Junior Fellow applications) or [figss@uni-frankfurt.de](mailto:figss@uni-frankfurt.de) (for Graduate School applications)**. The review of incoming applications will begin immediately.