Center for Advancing Electronics Dresden

The Junior Research Group “Biological Algorithms” (funded by the Heisenberg Programme of the DFG, headed by PD Dr. Benjamin Friedrich, jointly affiliated with the Cluster of Excellence “Physics of Life” (PoL)) offers a position as

Postdoc in Theoretical Biophysics / Stochastic Nonlinear Dynamics
(subject to personal qualification employees are remunerated according to salary group E 13 TV-L)

Research area: Information theory of cellular navigation in complex, time-varying environments

Terms: starting as soon as possible, fixed-term for 2 years. The period of employment is governed by the Fixed-Term Research Contracts Act (Wissenschaftszeitvertragsgesetz – WissZeitVG). The position offers the chance to obtain further academic qualification.

The Junior Research Group “Biological Algorithms”
Our mission is to theoretically understand physical principles of cellular motility control and self-organization in living matter. We combine nonlinear dynamics, statistical physics, information theory, and numerical simulations to understand the algorithms and mechanisms that enable biological systems to perform their function despite noise and perturbations, often in close collaboration with experimental partners. Research topics include navigation of biological microswimmers and pattern formation in cells, and tissues. More information on our current research can be found at https://cfaed.tu-dresden.de/friedrich-home.

About the project
The successful candidate will develop an information theory of optimal navigation in dynamic environments in the presence of both sensing and motility noise, inspired by cellular chemotaxis at microscopic scales. Chemotaxis - the navigation of biological cells guided by chemical gradients - is crucial for bacterial foraging, immune responses, and guidance of sperm cells to the egg during fertilization. Cellular navigation represents a model system for the physics of autonomous motility at the microscale and its control by sensory cues.

You will establish a general theoretical framework of sequential Bayesian estimation of dynamic concentration fields, and navigation therein e.g. towards hidden chemoattractant sources, by combining analytical and numerical approaches. As specific biological model system, this theory can be applied by you e.g. to the prototypical case of sperm chemotaxis in marine species, where small-scale turbulence distorts chemoattractant concentration fields in their natural oceanic habitats. Reference: https://doi.org/10.1371/journal.pcbi.1006109

Requirements
We are looking for a theoretical physicist (or applied mathematician), who is intrigued to discover algorithms of life, and meets the following requirements:

- outstanding university degree and PhD in Physics, or closely related field
- experience in Computational Physics (ODEs, PDEs, SDEs), and strong programming skills (e.g. Matlab, Python, C)
strong interest in applying physics to understand life, willingness to learn some biology \textit{en route}

- strong analytic and problem-solving skills, creativity
- an independent, target- and solution-driven work attitude
- strong communication skills, especially in cross-disciplinary communication
- fluency in English – oral and written
- experience in statistical physics, nonlinear dynamics, stochastic processes; information theory is a plus.

\textbf{What we offer}

You will join an enthusiastic and ambitious Junior Research Group, where you can drive your project forward and benefit from inspirational interactions with like-minded researchers. The working language of our international team is English and no knowledge of the German language is required.

Dresden is a European hub for Biological Physics that unites excellence in information and life sciences. You will be embedded in two research clusters, where we contribute bio-inspired algorithms of biological information processing and molecular self-assembly. As part of the Cluster of Excellence “Physics of Life”, we enjoy the close proximity of collaboration partners at the Max-Planck Institute of Molecular Cell Biology and Genetics, the Biotechnology Centre, and the new Center for Systems Biology Dresden.

For informal enquiries, please contact PD Dr. Benjamin Friedrich at benjamin.m.friedrich@tu-dresden.de.

Applications from women are particularly welcome. The same applies to people with disabilities.

\textbf{Application Procedure}

Your application (in English only) should include: a motivation letter, your CV with publication list, the names and contact details of two references, copy of degree certificate, and transcript of grades (i.e. the official list of coursework including your grades). Please include also a link to your Master’s or PhD thesis. Complete applications should be submitted preferably via the TU Dresden SecureMail Portal https://securemail.tu-dresden.de by sending it as a single pdf document quoting the reference number PD-Bio0220 in the subject header to recruiting.cfaed@tu-dresden.de or by mail to: TU Dresden, cfaed, Junior Research Group “Biological Algorithms”, Herrn PD Dr. Benjamin Friedrich, Helmholtzstr. 10, 01069 Dresden, Germany. The closing date for applications is \textbf{14.02.2020} (stamped arrival date of the university central mail service applies). Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.

\textbf{Reference to data protection:} Your data protection rights, the purpose for which your data will be processed, as well as further information about data protection is available to you on the website: https://tu-dresden.de/karriere-datenschutzhinweis

\textbf{About TU Dresden}

The TU Dresden is among the top universities in Germany and Europe and one of the eleven German universities that were identified as an ‘elite university’. As a modern full-status university with 18 departments it offers a wide academic range making it one of a very few in Germany.