Technische Universität Dresden (TUD), as a University of Excellence, is one of the leading and most dynamic research institutions in the country. Founded in 1828, today it is a globally oriented, regionally anchored top university as it focuses on the grand challenges of the 21st century. It develops innovative solutions for the world's most pressing issues. In research and academic programs, the university unites the natural and engineering sciences with the humanities, social sciences and medicine. This wide range of disciplines is a special feature, facilitating interdisciplinarity and transfer of science to society. As a modern employer, it offers attractive working conditions to all employees in teaching, research, technology and administration. The goal is to promote and develop their individual abilities while empowering everyone to reach their full potential. TUD embodies a university culture that is characterized by cosmopolitanism, mutual appreciation, thriving innovation and active participation. For TUD diversity is an essential feature and a quality criterion of an excellent university. Accordingly, we welcome all applicants who would like to commit themselves, their achievements and productivity to the success of the whole institution.

At the **Cluster of Excellence „Physics of Life" (PoL),** the **Heisenberg Chair of Biological Algorithms (Prof. Dr. Benjamin Friedrich)** offers a position as

Research Associate / PhD student (m/f/x)
in Theoretical Biological Physics (Modeling sarcomere self-assembly)
(subject to personal qualification employees are remunerated according to salary group E 13 TV-L)

starting **as soon as possible**. The position entails 65% of the fulltime weekly hours and is **limited to 36 months**. 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 (usually PhD).

The team: We are a group of curious and motivated theoretical biological physicists who ask how physical mechanisms shape functional biological patterns. We combine statistical physics, nonlinear dynamics, mathematical modeling and data-driven simulation with physics-inspired data and image analysis, often in close collaboration with experimental partners, to identify physical principles behind biological dynamics and self-organization.

The project: Voluntary motion in animals is driven by the contraction of micrometer-sized sarcomeres in muscle cells. The highly regular arrangement of actin filaments and myosin molecular motors in each sarcomere characterize these structures as "cytoskeletal crystals" that form spontaneously inside muscle fiber cells. Yet, despite their physiological importance, we do not know how sarcomeres self-assemble. Together with the experimental group of Frank Schnorrer (IBDM, Marseilles, France), we seek to identify physical mechanisms of sarcomere self-assembly, including the spontaneous formation of first periodic patterns in initially unstriated acto-myosin bundles, and subsequent mechanisms of sarcomere addition by a newly identified mechanism of sarcomere division.

Your tasks. Within a DFG-funded project, you will develop data-inspired and data-driven models of sarcomere assembly. This will involve mean-field models and agent-based simulations. Additionally, depending on your aptitude, you can analyze topological defects of smectic-liquid crystal order in developing cross-striated muscle, or use machine-learning to expand existing custom-built image analysis pipelines (Python, Matlab). You will be involved in writing scientific publications, presenting your research internally and at internal conferences, and, if you want, gain first experience in applications for third-party funding.

To learn more about this project, we highly recommend checking out two exemplary recent publications (and maybe even the corresponding code and image repositories):

- Rodier et al.: Muscle growth by sarcomere divisions. bioRxiv (2024) https://doi.org/10.1101/2024.12.18.629106
- Kolley et al.: Mechanisms of Sarcomere Assembly in Muscle Cells Inferred from Sequential Ordering of Myofibril Components. PRX Life (2024) https://doi.org/10.1103/PRXLife.2.013002

Requirements:

- outstanding Master-level university degree in Physics, Applied Mathematics, or a related field
- keen interest in theoretical biological physics
- ideally first experience in theory-experiment collaborations
- programming skills and first experience in data and image analysis
- excellent communication and presentation skills in English
- high self-motivation and independent, target- and solution-driven work attitude

What we offer: We offer the opportunity to contribute to exciting research projects right at the intersection of Physics and Biology, while starting your academic or professional career. You will be embedded within the highly interactive and interdisciplinary research environment of the Cluster of Excellence "Physics of Life" and the Dresden Life Science Campus. Employment conditions include a comprehensive package with full social benefits. Dresden offers a high-quality of life with a relatively low cost-of-living.

TUD strives to employ more women in academia and research. We therefore expressly encourage women to apply. The University is a certified family-friendly university and offers a Dual Career Service. We welcome applications from candidates with disabilities. If multiple candidates prove to be equally qualified, those with disabilities or with equivalent status pursuant to the German Social Code IX (SGB IX) will receive priority for employment.

Please submit your detailed application documents by **May 31, 2025** (stamped arrival date applies), preferably via the TU Dresden SecureMail Portal https://securemail.tu-dresden.de by sending it as a single pdf file to **benjamin.m.friedrich@tu-dresden.de** or to: **TU Dresden**, **Heisenberg-Professur für Biologische Algorithmen, Prof. Dr. Benjamin Friedrich, Arnoldstraße 18, 01307 Dresden, Germany**. Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.
