The **Cluster of Excellence "Physics of Life" (PoL)** offers a position shared between the **Junior Research Groups** for **Dynamics of Biomolecules** (Dr. Marcus Jahnel) and **Bio-image data science** (Dr. Robert Haase), as

Research Associate / Postdoc in Smart Microscopy (m/f/x)
"Smart Optical Tweezers To Probe Biomolecular Condensates"
(Subject to personal qualification employees are remunerated according to salary group E 13 TV-L)

starting **as soon as possible**. The contract will be limited to 2 years with the possibility of extension. The period of employment is governed by the Fixed Term Research Contracts Act (Wissenschaftszeitvertragsgesetz WissZeitVG). Balancing family and career is an important issue. The position is generally suitable for candidates seeking part-time employment. Please indicate the request in your application.

The Cluster of Excellence PoL (https://physics-of-life.tu-dresden.de/en) is an interdisciplinary research center for biology, biophysics, and computer science, funded by the German Research Foundation (DFG), and offers a wide range of support structures. You will be part of two Junior Research Groups, *Dynamics of Biomolecules* and *Bio-image data science*, at PoL and work in a highly interdisciplinary environment. Our mission is to combine state-of-the-art single-molecule experiments (optical tweezers), real-time image processing routines, control theory, and deep learning algorithms to unravel the biology and physics of phase-separating protein-RNA systems. You will work closely with experimentalists studying biomolecular condensates and computer scientists developing novel data science solutions. Projects are typically conducted in small interdisciplinary teams. Like all team members, you know how to work independently, take the initiative if necessary, be a team player, and be comfortable leading a project team.

Tasks: *Develop smart optical tweezers to probe biomolecular condensates:* We aim to advance the systematic high-throughput characterization of biomolecular condensate states by establishing an autonomous optical tweezer platform to investigate their material properties under various conditions. Quantitative comparison of many condensates will provide insight into protein-nucleic acid condensation phenomena and serve as a starting point for machine learning strategies to predict the behavior of unknown multicomponent systems. You will spearhead the development of an autonomous condensate characterization platform based on existing custom-built dual-trap optical tweezers. You will take advantage of an existing software prototype and established open-source software libraries to build up smart autonomous microscopy control software. The software you will develop will comprise a whole feedback loop consisting of microscope control, image acquisition, GPU-accelerated quantitative image analysis, machine learning, and logical reasoning to feed information back to the microscope control unit. You will also simulate acquisition scenarios to prove the robustness of the system. You will work closely with biologists and physicists to advance their large-scale data acquisition experiments by automating laborious routines using artificial intelligence. You will be responsible for research data management, and you will have the opportunity to lead data mining the resource you and your colleagues will build up during the experimental session.

Skills and formal requirements:
- a university degree in computer science, mathematics, physics, biology, engineering, or natural sciences
- advanced programming experience in Python
- Experience with OpenCL, CUDA, C++, Java, or LabView is a plus.
- A background or experience with robotics, control theory, and feedback systems is a plus.
- Proven work experience in data analysis, feature extraction, statistics, (un)supervised machine learning, or reinforcement learning is a plus.

- Experience working with optical tweezers or other single-molecule methods and familiarity with the corresponding data analysis tasks (especially time series analysis) is a plus.
- Experience in developing domain-specific languages (DSLs) is a plus.
- Experience in using version control systems such as GitHub or GitLab is necessary.
- excellent communication and writing skills, fluency in English (B2)
- Experience in computational biology, molecular biology, or biophysics is a plus.

For any questions regarding the position, please feel free to contact Dr. Marcus Jahnel (marcus.jahnel@tu-dresden.de) or Dr. Robert Haase (robert.haase@tu-dresden.de).

What we offer

Our teams embrace a diversity of disciplines and opinions, which we consider a driver for critical thinking and discoveries. We foster a collaborative spirit essential for making progress on challenging problems. We offer an international and interdisciplinary research environment of high standing and visibility with challenging midterm projects on diverse research topics. You will be part of the PoL community, the Dresden Campus, and our extensive international network. We offer the opportunity to work at the interface of quantitative biology, biophysics, robotics, and machine learning. There will be many opportunities to develop your academic or professional career, such as conferences, workshops, and hackathons. We provide the opportunity to acquire teaching skills, project management skills, and team leadership skills, for example, through our Graduate Academy (https://tu-dresden.de/ga). According to the State Tariff for Civil Servants (TV-L), employment conditions include a comprehensive package with full social benefits and remuneration. Balancing family and career is vital for us. We offer flexible and family-friendly working hours and childcare through partnerships with nearby daycare centers.

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

We highly encourage all genders to apply. A person with disabilities will be given preference among candidates with equal aptitude and qualifications. Please submit your complete applications with a letter of motivation, your CV, a list of your publications, open-source projects, or both, and a copy of the certificate of your highest academic degree by **May 17, 2022** (stamped arrival date applies) preferably by email in one single PDF document via the SecureMail Portal of the TU Dresden, https://securemail.tu-dresden.de to **yasmin.guenterberg@tu-dresden.de** with the subject line "PostDoc TweeBot: Smart Optical Tweezers" or by mail to: **TU Dresden, Exzellenzcluster "Physik des Lebens", z.H. Herrn Dr. Marcus Jahnel, Arnoldstrasse 18, 01307 Dresden.** Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.