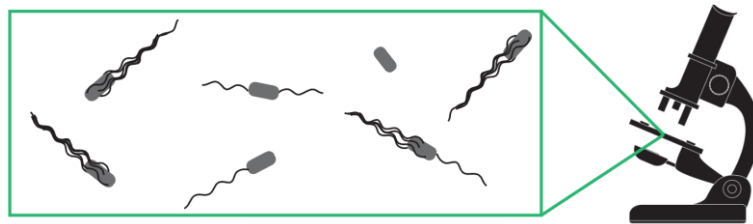


## PhD Position – Grognot Lab at RWTH Aachen

The *Biophysics of Host-Microbe Interactions* Group at the Institute of Medical Microbiology of RWTH Aachen (Germany) offers 1 PhD position on a 3-year contract at first, partially funded through RWTH's START Fund. **The position is available from now, will stay open until filled, with a starting date between September and December 2023.**

The position is project-specific and with a salary corresponding to 65% of level [E13](#) on the DFG pay scale. The successful candidate has the opportunity to pursue a doctoral degree. The project is centered on the development of a bacterial 3D tracking method and the subsequent tracking of bacterial pathogens in complex environment (viscous media, soft agar, mucus).



### **The project:**

An estimated half of bacterial pathogens can swim by using one or several flagella, displaying a wide diversity in swimming behaviors. Motility can improve a bacterium's performances at spreading, searching food sources, surviving... and infecting a host. Yet we know surprisingly little about how different species swim and orient themselves, even less in host-relevant environments. For example, it is still unclear how, how fast and how well a motile bacterium can swim through the mucus layer protecting our gut epithelia –a critical early step in infection. This is in part due to the limitations of current widespread bacterial tracking methods. Our lab has an expertise in quantifying bacterial motilities and chemotaxis, using high-throughput bacterial 3D tracking and other related assays (e.g. [Grognot et al., \*Commun. Biol.\* 2021](#)), to measure and compare bacterial populations performances as well as understand the underlying swimming mechanisms. In this context, we aim in this project to (1) improve our 3D tracking microscopy technic to interrogate motilities in real mucus, (2) investigate the performances of different pathogenic species through a mucus-barrier model, and (3) assess how these performances are modulated by different factors (e.g. type of mucus, bile, antimicrobials, virulence factors...).

**Job description:** You will develop a 3D tracking method using fluorescence microscopy, based on a similar principle (defocusing particle tracking) than the 3D tracking method we currently use. This will allow you to track bacteria in a range of complex environments. With the support of our laboratory technician, you will grow mucus-producing cells, then add bacterial pathogens on top of their mucus layer, and track them *in situ*. The resulting large number of bacterial trajectories will then be analyzed using home-made code (MATLAB), to quantitatively assess speed, bias toward epithelium, infection success rate, etc. Taking advantage of our quantitative approach, the influence of multiple factors and drugs will also be tackled. You will initially focus on the performances of *Vibrio cholera*, the causative agent of cholera. Depending on the results obtained during the first two years, you can later broaden your work to other pathogens, and/or to more complex models of the mucus barrier.

**Your profile:** You hold a Master degree (or equivalent) in Science. Given the highly interdisciplinary nature of the project, **we welcome applications from very diverse backgrounds** (optics, biophysics, quantitative microbiology, biomedical engineering...) if they display at least 2 of the following experience (or education in -): Microbiology (work in biosafety level 2 environment is a plus);

Knowledge of at least one programming language (MATLAB is a plus); Fluorescence microscopy or Optics; Advanced eukaryotic cell culturing. Experience in image/movie analysis is also plus. The PhD student will of course be trained in all necessary aspects missing from his/her initial profile. Throughout the years, he/she is expected to increasingly take responsibility for the project and develop proficiency in scientific writing and communications.

**Soft skills:** You are rigorous, open-minded and eager to learn and improve cutting-edge methods. You are strongly interested in bridging the gap between biophysics and medically relevant questions. You thrive in and participate to a benevolent multicultural scientific environment. A good level of English (B2 and above) is required, complete fluency (C2) is a plus.

**We offer:** A new and interdisciplinary laboratory, with state-of-the-art techniques and equipment, in a welcoming and very dynamic Institute. Please visit our institute [website](#) for more detailed information. RWTH is part of the nine “Universities of Excellence” in Germany, with a strong recognition from both academia and industry. It is located in beautiful Aachen, in the heart of Europe, close to Belgium, the Netherlands and France.

**Application:** Please send one pdf file (named YOUR-NAME\_START\_GrognotLab) by email to Prof. Grognot, including: motivation letter (two pages max, can be the email body), curriculum vitae including list of publications if applicable, full transcripts of grades (translated if not in English, French or German), and contact information of at least two references. The pdf document must be in English. **Any question beforehand is welcome.**

**Contact person:** Jun.-Prof. Dr. Marianne Grognot, Institute of Medical Microbiology, RWTH Aachen, Pauwelsstraße 30, 52074 Aachen, Germany; **E-Mail:** [mgrognot@ukaachen.de](mailto:mgrognot@ukaachen.de)

*The RWTH Aachen University is certified as a family-friendly university and offers a dual career program for partner hiring. We particularly welcome and encourage applications from women, disabled people and ethnic minority groups, recognizing they are underrepresented across RWTH Aachen University. The principles of fair and open competition apply and appointments will be made on merit.*