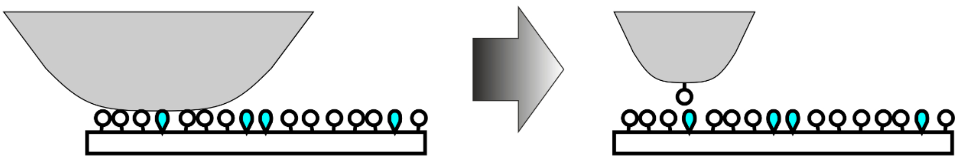
Universität Regensburg

Ph.D. position in experimental physics

Exploring friction atom-by-atom

On a global scale, 20% of the energy produced is used to overcome friction. Friction is an incredibly complex phenomenon including adhesion, bond breaking and various energy dissipation pathways. Despite the importance of friction, it is most often explained with empirical formulas. Nanotribology is the study of friction at the nanometer-length scale, used to control the interface and isolate dissipation pathways. In normal nanotribology experiments, there are still many atoms contacting each other, complicating understanding of the results. We want to push these kinds of experiments to the atomic level, where we study the friction as a single atom moves over a surface.



We use a variant of atomic force microscopy to study the lateral forces. We have previously conducted experiments at room temperature to understand friction anisotropy, but this time we will measure at low temperature so we can have atomic control of our tip apex.

In this project, we will explore friction at the single-atom limit to understand dissipation pathways. Candidates must have a Masters degree in Physics or a related field. Applications must include a CV, a cover letter indicating why this position is appealing to you, and a transcript of recent grades. They should be sent per email to:

PD Dr. Alfred J. Weymouth
jay.weymouth@ur.de

Related articles:

- A.J. Weymouth, E. Riegel, O. Gretz and F.J. Giessibl. *Strumming a single chemical bond*. Phys. Rev. Lett. **124**, 196101 (2020)
- J. Weymouth, T. Hofmann and F. J. Giessibl. *Quantifying Molecular Stiffness and Interaction with Lateral Force Microscopy*. Science, **343**, 1120 (2014)
- J. Weymouth, D. Meuer, P. Mutombo, T. Wutscher, M. Ondracek, P. Jelinek, and F. J. Giessibl. *Atomic structure affects the directional dependence of friction*. Phys. Rev. Lett., **111**, 126103 (2013)