



UNIVERSITÄT  
LEIPZIG

Fakultät für Physik und  
Geowissenschaften

Prof. Dr. J. Deiglmayr  
Prof. Dr. J. Vollmer

# Physics Colloquium

Tuesday, 11 January 2022 at 17:00

Prof. Dr. Frauke Gräter

Heidelberger Institut für Theoretische Studien and the University of Heidelberg

## Stressed soft matter: How tendons handle tension and free electrons

Polymers subjected to mechanical stress – be it a shoe sole or rubber band – generate mechanoradicals by undergoing bond scission, a fact known for a century and harnessed technologically. We uncovered, using electron-paramagnetic resonance spectroscopy, the very same mechanism to be at play in tendon collagen, the major force-carrying protein material of our body. Using hybrid Monte Carlo / Molecular Dynamics simulations, we predict such radical reactions within stretched collagen and interpret the experiments. I will also show how we more recently employ graph-based Machine Learning techniques to estimate involved reaction barriers from pre-computed quantum chemical data.



Our results show how collagen has been designed by evolution not only to carry but also to sense high mechanical loads through mechanically generated radicals.

Online Colloquium broadcasted by BigBlueButton at

<https://lecture.uni-leipzig.de/b/vol-qad-yhg-c2k>

