



PHYSIKALISCHES  
I N S T I T U T



UNIVERSITÄT  
HEIDELBERG  
ZUKUNFT  
SEIT 1386

## PhD Position for Spin-Selective Neutron Detection using Quantum Sensing

Low-Energy Precision Physics (LEPP), Physikalisches Institut, Heidelberg University



Neutrons make up 50% of matter on earth, but remain one of its most mysterious components: their decay lifetime is less well-known than the age of the Universe, and their internal charge structure is deeply connected to the absence of antimatter in the cosmos.

Precision experiments with ultracold neutrons already reach energy resolutions of  $10^{-22}$  eV or better, and powerfully test the Standard Model of particle physics. They further constrain CP-violating new physics at scales of 10-100 TeV, far beyond the reach of the LHC.

The new LEPP group at Heidelberg seeks to bring quantum sensing methods into precision neutron science, further extending the power and reach of these measurements. Innovative new devices can significantly impact next-generation experiments at large facilities.

**Tasks:** This project will develop innovative ultracold neutron detectors, using superconducting microstructures for spin- and energy-selectivity. Calculations and simulations will guide fabrication of experimental prototypes, to be tested in beamtime experiments at world-leading neutron science facilities (e.g. ILL Grenoble, FRMII Munich). Experimental hardware is developed at Heidelberg, and supported by the Institute's design office and mechanical workshop. Data analysis, writing and publishing research articles, and presenting at topical conferences/workshops are an integral part of this project.

### Requirements:

- Master degree in physics or similar (grades equivalent to 2,0 or better in the German system)
- Coursework/lab experience in atomic/molecular/optical or low-energy nuclear/particle physics
- Strong supporting letters of recommendation
- English-language proficiency (reading, writing, speaking)

Applications will be considered until the position is filled. Those received **before June 30<sup>th</sup> 2022** are guaranteed full consideration. If you have any questions, please do not hesitate to contact us! [sekretariat-degenkolb@physi.uni-heidelberg.de](mailto:sekretariat-degenkolb@physi.uni-heidelberg.de)

*Heidelberg University is an equal opportunity employer and welcomes applications from women. Handicapped applicants will be preferentially treated, if equally qualified.*