MAX PLANCK INSTITUTE
FOR HUMAN COGNITIVE AND BRAIN SCIENCES

Monday, July 03, 2023, 3pm
Stephanstrasse 1A
Lecture Hall, 1st and 2nd Floor

Guest Lecture

Prof. Dr Peter Krüger

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Atomic probes as sensitive tools: measuring brain signals and beyond

Magnetic fields are ubiquitous in nature and since a long time also in technology. Yet, there are many open questions, needs for research and emerging new applications. Standards need to be set or refined, and more accurate calibrations are required by industrial adopters of new technologies. A particular challenge and opportunity arise at the lowest end of the spectrum of magnetic fields. With demonstrated measurement sensitivities beyond the femtotesla (per root Hertz) scale, the neuronal activities of the brain following a peripheral nerve stimulus become detectable in a single trial, for example. While even the foundations of physics can be tested at the frontier of lowest metrological noise floors, a current trend is to make magnetic field measurement and imaging viable in application contexts beyond quantum physics laboratories.

Here, we will discuss such developments in terms of sensor developments, measurement environments and key use cases. We will focus on atomic gas-based probes of stationary and slowly varying magnetic fields. With trapped ultracold gases, high resolution field mapping can be achieved with relevance to material developments such as indium tin oxide replacements for next-generation touch screens and solar panels.