



2025 HGF – GSI – OCPC – Programme

For the involvement of postdocs in bilateral collaboration projects

Title of the project:

Fundamental Physics, Atomic, Molecular and optical Physics

Helmholtz Centre and institute:

Helmholtz-Institute Mainz

Project leader:

Prof. Dr. Dmitry Budker

Web-address:

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Department: (at the Helmholtz centre or Institute)

Matter-Antimatter Asymmetry Section (MAM)

Programme Coordinator (Email, telephone and telefax)

Dr. Pradeep Ghosh

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Description of the project (max. 1 page):

Our research group at the Helmholtz Institute of Mainz focuses on testing fundamental symmetries of nature in experiments that utilize the methods of atomic, molecular, and optical physics. The group has experience in designing and conducting precision experiments using a variety of techniques, including high-sensitivity magnetometers, and applying them to important problems.

- **Magnetometry with diamond color centers for fundamental physics**
- **Dark matter: the CASPER experiment (Cosmic Axion Spin Precession Experiment)**
- **Dark matter: the GNOME experiment (Global Network of Optical Magnetometers for Exotic physics searched)**
- **Magnetometry for antimatter experiments**
- **Fundamental physics experiments with dysprosium atoms**
- **Zero- to Ultra-low field Nuclear Magnetic Resonance (ZULF NMR)**
- **Parity violation in ytterbium**
- **Cavity-enhanced chiral polarimetry**
- **Physics and applications of sodium laser guidestars (LGS)**



All of these projects are tightly integrated with many other current projects in our group and collaborators from other groups at Mainz, elsewhere in Germany, and all over the world. This facilitates exchange, learning and a fast experimental progress. Furthermore, we offer an innovative, well-equipped and scientifically stimulating environment and a broad range of training opportunities.

Description of existing or sought Chinese collaboration partner institute (max. half page):

We have existing collaborations with several institutions in China, including USTC (Hefei) and Peking University (Beijing).

Required qualification of the post-doc:

- PhD in Physics
 - Strong background in experimental and theoretical atomic physics, laser physics, NMR
 - Good programming skills: MATLAB, Labview, C or C++
 - Language requirement: Proficiency in written and spoken English
 - Being comfortable in interacting with colleagues in an interdisciplinary setting
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