Leibniz Ferdinand Braun Institut

Master / Bachelor Thesis

Joint lab Integrated Quantum Sensors

Quantum sensors with cooled strontium atoms for space applications: Optical lattice clock

As part of our activities on frequency references based on atomic strontium, we are looking for highly motivated Bachelor and Master students in the fields of experimental physics and optical sciences.

Compact and robust optical frequency references receive increased attention with respect to space-borne operation. Current and planned applications for optical frequency standards in space include earth-observation and fundamental science missions. In our lab we intend to stabilize the frequency of a laser to better than one part in 10^{15} using an optical Ramsey spectroscopy technique on a thermal strontium beam. To improve the clock stability by a factor of 100 we are setting up a new designed optical lattice clock. Strontium atoms are laser cooled and then trapped in an optical lattice inside an ultra-high vacuum chamber. Our setup provides a flexible platform for a variety of new exciting experiments with strontium, among other thing measuring gravity or exploring the rich physics of Rydberg.

Left: Currently employed spectroscopy cell with a simple strontium source. Right: A cold cloud of strontium atoms, laser cooled in a magneto optical trap. This will be the starting point of our new setup.

The activities of the Bachelor or Master thesis are diverse, from building lasers and use them directly in the experiment, planning and CAD design of the vacuum chamber, theoretical calculations to support the experiment and writing a timing system with data acquisition and analysis. We offer support optimized individually for every new group member. Progress is regularly evaluated in discussions. Goals are set and problems are solved together. A background in laser physics, spectroscopy or optical technologies is desired. If you're interested, don't hesitate to contact us.

We are a place where all members of the LGBTQ community are welcomed and valued for their unique, individual identities.

Contact

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