Cold atoms

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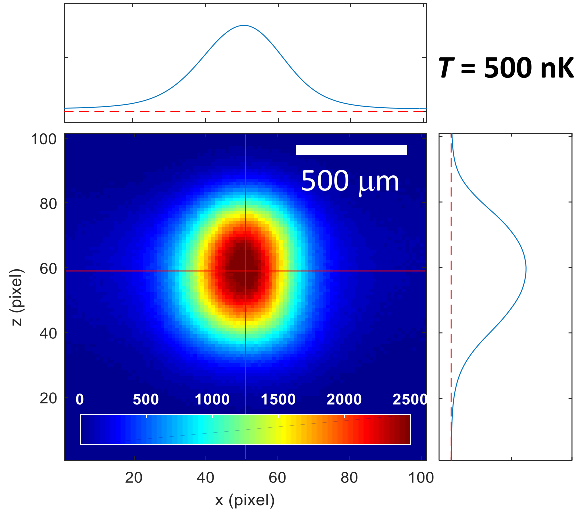
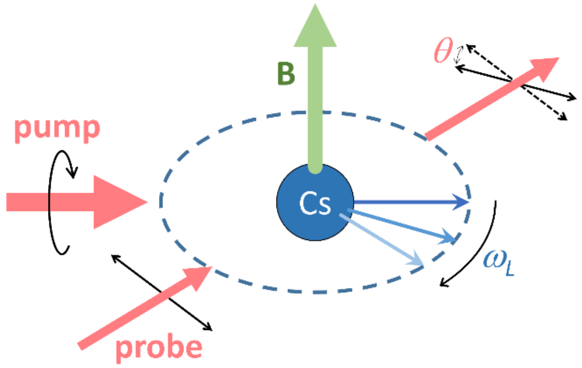


The Cold atoms laboratory at the Jožef Stefan Institute has a working magneto-optical trap (MOT) with additional Raman sideband cooling stage currently producing cold cesium atoms at temperatures **below 500 nanokelvin**. The lab infrastructure fulfills the highest possible standards for highly complex and sensitive experimental equipment including optical tables, air-sock air-conditioning, dedicated electric power supply and ultra-high vacuum chambers with optical access (pressure in the 10^{-11} mbar range).



In atomic magnetometer the pump light polarizes the atoms (e.g., hot or cold cesium atoms), atomic polarization evolves in the magnetic field, and the resultant state of the atoms' polarization is detected by measuring polarization rotation of the probe light.

The **quantum technologies** based on cold atoms have an enormous potential for innovation both on a fundamental level and in real-world applications such as quantum-based sensors for gravity, acceleration, rotation and magnetic fields. We are planning to develop a **high-resolution cold-atom magnetometer** with a potential to be used in various fields, including a signal detection in NMR and MRI, as well as NQR, control of magnetic fields in precise experiments, such as in atomic physics, direct measurement of magnetic fields from the heart and brain, magnetic microscopy, geomagnetic fields – earthquake prediction, finding oil, investigation of magnetic properties of rocks and minerals.