

**ABSTRACT:**

Since about twenty years atom interferometers have been studied for measuring inertial forces to high precision with atoms in free fall. The use of cold atoms was key for a reduction of the size of these devices. New methods of cooling and trapping permit to perform interferometry with guided atoms which opens new perspectives for measuring forces with high spatial resolution. This thesis explored both directions by employing atoms in free fall for rotation sensing and guided atoms for testing gravity at close distances.