Abstract Submitted
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Atom-chip based quantum gravimetry with Bose-Einstein condensates[1] SVEN ABEND, MATTHIAS GERSEMANN, HOLGER AHLERS, ERNST M. RASEL, Institut fuer Quantenoptik, Leibniz Universitaet Hannover, MARTINA GEBBE, HAUKE MUENTINGA, CLAUS LAEMMERZAHL, ZARM, Universitaet Bremen, QUANTUS TEAM — Today's generation of inertial sensitive atom interferometers typically operate with sources of laser cooled atoms and thus their performance is limited by velocity spread and finite-size effects that impose systematic uncertainties. Ultra-cold sources such as a BEC or even delta-kick cooled atomic ensembles with extremely narrow velocity dispersion are able to overcome these limitations and are crucial for obtaining high-fidelity beam splitters. Atom-chip technologies offer the possibility to generate a BEC and perform delta-kick cooling in a fast and reliable away. We show a combination of such an ensemble generated in a miniaturized atom-chip setup with the application of low-loss Bragg beam splitting to perform inertial sensitive measurements. A specialty of this setup is the retro-reflection of the beam splitting light field from the atom-chip itself, serving as inertial reference in vacuum. This allows for a compact realization of a quantum gravimeter determining the local gravitational acceleration to the scale of local variations limited by seismic noise.

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