Post Deadline Abstracts

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Towards a quantum test of the equivalence principle using atom interferometry

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Abstract

We present our experimental approach to realize a dual species atom interferometer performing a differential acceleration measurement with quantum objects, namely ^{87}Rb and ^{39}K atoms, to test the weak equivalence principle (universality of free fall) [1].

A compact and versatile laser system provides 5W for incoherent and coherent manipulation of both species allowing for trapping, cooling and driving stimulated Raman transitions with the same setup [2][3]. After dropping the atoms a detection cube below the MOT region allows for high NA state selective detection. Additionally the system provides an optical dipole trap at a wavelength of 1.96μm to enable very accurate initial position control of the two ensembles and leave options for evaporative and/or sympathetic cooling.

Keywords: ATOM INTERFEROMETRY, GRAVIMETRY, METROLOGY

References

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[3] Gilowski et al., Opt. Comm. **280**, 443 (2007)