

Abstract Submitted  
for the DAMOP15 Meeting of  
The American Physical Society

**Simultaneous Dual-Species Atom Interferometry** ALEXIS BONNIN, NASSIM ZAHZAM, YANNICK BIDEL, ALEXANDRE BRESSON, ONERA, SENSORS AND MICRO TECHNOLOGIE UNIT TEAM — In the context of testing the Weak Equivalence Principle (WEP) with matter-wave accelerometers, some projects under development aim to compare the acceleration of two different atomic species during few seconds of free fall in order to achieve highly sensitive measurements.<sup>1,2,3</sup> A simultaneous interrogation of both atomic species is crucial to fully take advantage of a differential measurement. We report the realization of an atom interferometer based on Raman transitions which simultaneously interrogates both isotopes of Rubidium.<sup>4</sup> The simultaneous aspect of our experiment allows the resolution of the differential accelerometer to remain lower than  $7.10^{-9}g$  even with vibration levels up to  $3.10^{-3}g$  thanks to common-mode vibration noise rejection. These results exhibit a rejection ratio of 90 dB. An atom based test of the WEP has been carried out leading to a differential free fall measurement between both isotopes of  $\Delta g/g = (1.2 \pm 3.2) \times 10^{-7}$ .

<sup>1</sup>S. Dimopoulos et al., Phys. Rev. Lett. 98, 111102 (2007)

<sup>2</sup>H. Müntiga et al., Phys Rev. Lett. 110, 093602 (2013)

<sup>3</sup>R. Geiger et al., Nature Commun. 2, 474 (2011)

<sup>4</sup>A. Bonnin et al., Phys. Rev. A 88, 043615 (2013)

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Date submitted: 26 Jan 2015

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