Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

**A Nuclear-Electronic Spin Gyro-Comagnetometer** GEOFFREY RENON, NASSIM ZAHZAM, YANNICK BIDEL, ALEXANDRE BRESSON, DMPH, ONERA The French Aerospace Lab, Palaiseau, France, PIERRE-JEAN NACHER, Laboratoire Kastler Brossel, ENS, CNRS, UPMC, Paris France — We have started a project aiming to fully characterize a new generation of atomic gyroscope based on the detection of a nuclear spin orientation with an alkali magnetometer [1]. The key element of the device is a spherical gas cell heated at about 110°C and shielded from parasite magnetic fields. This cell is filled with an alkali gas (Rb) with an electronic spin and a noble gas ($^{129}$Xe) with a nuclear spin. $^{129}$Xe is polarized by Spin Exchange Optical Pumping (SEOP). The magnetic field created by the nuclear magnetization is canceled with a homogeneous magnetic field, so that Rb atoms feel no magnetic field and evolve in a collisional regime (Spin Exchange Relaxation Free – SERF) allowing the realization of an ultra sensitive in situ alkali magnetometer [2] which detects the nuclear spin dynamic and then gives us a rotation measurement of the system. Our project deals with the conception, realization and characterization of this atomic spin gyroscope very promising for applications requiring miniature sensors with high performances.

[1] T.W. Kornack, et al., "Nuclear Spin Gyroscope Based on an Atomic Comagnetometer", PRL, vol. 95, 230801, 2005.
[2] I.K. Kominis, et al., "A subfemtotesla multichannel atomic magnetometer", Nature, vol. 422, p. 596-599, 2003.

Geoffrey Renon
DMPH, ONERA The French Aerospace Lab, Palaiseau, France

Date submitted: 20 Feb 2013 Electronic form version 1.4