

Postdoctoral position at SYRTE
"Atom Interferometry and Inertial Sensors" Team

Optimization of quantum gravity sensors for embedded applications

Our group is looking for a postdoctoral fellow to work on the development of new technologies and methods for the realization of quantum gravity sensors for embedded applications. A major issue for this type of application is the control of parasitic accelerations and rotations, which induce biases and reduce the sensitivity of the measurement. In the framework of a collaborative project aiming at the realization of a new sensor more resilient to environmental constraints, he or she will study new methods based on the dynamic control of light beamsplitters to reduce the sensitivity of the sensor to perturbations. He or she will also work on data analysis for optimizing the extraction of the gravity signal in the presence of large noise, by taking advantage of correlations between the signals of the quantum sensor and other additional conventional sensors.

Planned activities: The work will be experimental and theoretical in nature. The post-doctoral fellow will contribute with the project partners to the design of a new sensor for embedded applications in strap-down mode. He or she will develop a model of the instrument that will allow to simulate the signal of the instrument in embedded mode, and in particular to calculate the impact of the sensor motion on the phase of the atomic interferometer. This model will allow the study of different rotation control strategies based on the compensation of the rotation of the laser beamsplitters, which will increase the dynamic range of the sensors. This model will ultimately allow the optimization of the sensor architecture. He or she will implement preliminary tests of these different strategies on a laboratory gravity sensor that is now operational. More generally, the work will focus on the optimization of sensor performance, in terms of sensitivity and accuracy, as well as data processing methods to improve the quality of gravity measurement.

Research environment: The post-doctoral researcher will join the "Atomic Interferometry and Inertial Sensors" team of SYRTE, a leading laboratory in the development of high sensitivity inertial sensors based on atomic interferometry, such as gravimeters and gyrometers, using trapped or falling cold atoms. He or she will work under the supervision of Franck Pereira dos Santos, Research Director at CNRS and team leader at SYRTE. He or she will collaborate with Quentin Beauvils, Research Engineer, who develops simulation tools for on-board gravity measurements, as well as with the PhD and post-doctoral students of the team for the experimental aspects. His or her work will be part of an important collaborative project, the ADEQUADE project, which aims, among other things, at improving gravity sensors for embedded applications. He or she will work in a consortium including, in addition to SYRTE, several academic and industrial partners, such as ONERA, the coordinator of the project, the Technical University of Denmark, the companies EXAIL, SENER and SAFRAN.

Start date: Early 2022, as soon as possible

Profile: The candidate must have a PhD in physics. The profile sought is that of an experimentalist, with capabilities and taste for simulation and modeling activities. Research experience in the field of cold atoms is mandatory. Any experience in the field of atomic interferometry will be highly appreciated.

Nationality: EU or Swiss citizenship mandatory

Contact: Send CV, publication list, motivation letter and references to the project leader, Franck Pereira dos Santos, franck.pereira@obspm.fr