SYRTE l'Observatoire de Paris | PSL
SYstèmes de Référence Temps-Espace

Post-doc vacancy

LNE-SYRTE, Observatoire de Paris, France, is opening a post-doc position in:

Optical referencing of a transportable Ytterbium lattice clock applied to geodesy

Position

Description: The frequency of OLCs (Optical Lattice Clocks) - based on the probing of the narrow transition ${}^1S_0 \rightarrow {}^3P_0$ of $\sim 10^4$ neutral atoms trapped in a "magic" optical lattice - can now be controlled at the 18 digits level. This makes them the most precise instruments ever built, which opens the possibility of applying this capacity to new fields of science: tests of General Relativity (Lorenz invariance, possible drift of fundamental constants), quest for dark matter, or sensing of the geopotential (chronometric geodesy). In this perspective, LNE-SYRTE is starting the development of a transportable optical lattice clock based on Ytterbium: the device will exploit the Equipex REFIMEVE+, a fiber network disseminating an ultrastable reference at 1542 nm over the French territory, in order to perform measurements of the Earth gravitational potential. The clock will be notably equipped with a transportable optical frequency comb allowing the referencing of all the necessary lasers and radio-frequency signals to the 1542 nm reference.
The candidate will be in charge of building the architecture (optical, microwave and programming aspects) necessary to evaluate the performance of the transportable comb with respect to the three optical combs already operational at LNE-SYRTE. She/he will assess the stability allowed by the transportable device, as well as the possible systematic uncertainties. The candidate will implement a comb-based frequency referencing of the lasers necessary to the cooling of neutral ytterbium (399 nm and 556 nm). She/he will develop the transfer of spectral purity from the ultrastable 1542 nm signal to 578 nm (metrological transition of Yb) and will evaluate the corresponding stability that can be delivered to the cold atoms. Finally, she/he will develop the first bricks of the automatizing and the complete remote control of the transportable ensemble (comb and clock).

Start date: Early 2021, to be discussed

Work place: LNE-SYRTE, Observatoire de Paris, France

Field: Frequency combs, transfer of spectral purity, atomic clocks, cold atoms.

Framework: The position is funded by LNE (Laboratoire National de métrologie et d'Essais), the project is funded by ANR (Agence Nationale pour la Recherche), and by DIM SIRTEQ (Science et Ingénierie en région Île-de-France pour les technologies quantiques)

Profile

The candidate must have completed a PhD in experimental physics. A strong interest for experimental work is necessary, an expertise in frequency combs, cw lasers, electronics and Python programming is required. Experience in ultrastable Fabry-Perot cavities is an asset. The candidate is expected to take responsibility in the project.
The SYRTE optical lattice clock team is composed of about 7 people. The Yb clock will benefit from the expertise acquired in the course of the construction of the three stationary optical clocks (2 based on Sr, 1 based on Hg). A good team spirit, as well as a good knowledge of English, are therefore absolutely necessary.

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Contact

Send a motivation letter, a CV with list of publications, and the name and contact information of two references before Dec. 15th, 2020 to:

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