Post-doctoral position

Hybrid ultrastable links for clocks comparison

Lab: **Laboratoire de Physique des Lasers**, MMTF group (http://www-lpl.univ-paris13.fr/UK/HOTES2.awp) and **LNE-SYRTE**, Optical frequencies metrology group (https://syrte.obspm.fr/spip/science/fop/experiences/article/optical-fiber-links).

Optical fiber links were developed in the last decade to transfer an ultrastable frequency reference over hundreds of km, with a minimal degradation of its stability and accuracy performance [1]. It consists of transmitting an ultrastable laser, which frequency is controlled with atomic clocks, through an optical fiber to the remote lab, with an active compensation of the propagation phase noise. We demonstrated that the transferred signal frequency is copying the input signal frequency with residual fractional unstabilities below 10^{-15} at 1-s averaging time [2]. The long-term stability can reach the 10^{-20} range.

Laboratoire de Physique des Lasers (Université Paris 13, CNRS) and LNE-SYRTE (Observatoire de Paris, CNRS, UPMC) have pioneered the development of optical links for applications both in time and frequency metrology and in high-precision measurements. We have recently demonstrated two international links to Germany and UK in order to compare the best optical clocks of these countries with the clocks developed at SYRTE [3]. We are also developing a national metrological network to transfer an ultrastable frequency signal to 20 labs over France [4].

We are seeking for a postdoctoral researcher to develop optical links which combine this classical method with the Two-Way transfer technique, used for satellite frequency transfer. He or she will study how the repeater laser stations we have developed can be used for such hybrid links and give the possibility to build new network architectures. It will be demonstrated between Paris and London (in collaboration with NPL), and Paris and Besançon (in collaboration with Femto-St). He or she will also study the technological and fundamental limits of such links.

The successful candidate will be highly motivated, strongly involved in experimental development, with abilities to work in a collaborative environment. He or she should have a Ph.D in applied physics or physics. An experimental background in optoelectronics, electronics, optical fibers, laser frequency stabilisation, or signal processing is welcome.

Applicants should address by e-mail to Pr. A. Amy-Klein (amy@univ-paris13.fr) a curriculum vitae, a list of publications, the name of two referees (with e-mail and affiliation) and a cover letter.

Post-doc starting date: between November 2016 and February 2017.
A one-year contract will be established, with the possibility to extend it 1 or 2 years more.

[1] O. Lopez et al., "Frequency and time transfer for metrology and beyond using telecommunication network fibres," Comptes Rendus Physique, 16, 531-539 (2015).
[2] N. Chiodo et al., "Cascaded optical fiber link using the internet network for remote clocks comparison," Optics Express, 23(26), 33927-33937 (2015).
[3] C. Lisdat et al, "A new era of international clock measurements," Nature Communications 7, 12443 (2016)
[4] http://www.refimeve.fr/

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