

Fully-funded PhD in fibre spool-based laser frequency stabilization techniques for metrology and industry

[NPL](#) is a world-leading centre of excellence in developing and applying the most accurate standards, science and technology available. It occupies a unique position as the UK's National Measurement Institute, at the intersection of scientific discovery and real world application. Its expertise and original research have underpinned quality of life, innovation and competitiveness for UK citizens and business for more than a century.

The [Optoelectronics Research Centre \(ORC\)](#) is a world-leading institute for photonics research based at the University of Southampton. It has contributed significantly to the remarkable growth of the photonics industry, including the optical telecommunication technology that underpins the Internet as well as many solutions in medicine, biosciences sensing, security and manufacturing. It produces around 200 publications per year, 25 invited or plenary talks, and has a spectacular history of innovation.

NPL and the ORC are seeking applicants for a fully-funded PhD in novel laser stabilization techniques for frequency metrology and industry.

State-of-the-art stabilized laser based on ultra-low expansion glass (ULE) cavities have shown outstanding frequency stability and ultra-low drift rates. However, these are relatively complex purpose-built, and difficult-to-transport optical setups which require a very careful initial alignment.

Many metrological and non-metrological applications do not require the extreme performance of ULE-based lasers, but at the same time they cannot make use of commercial lasers because of their high instability. These include reference lasers for physics experiment or state-of-the-art telecom applications. At present, there is no laser-stabilization technique that can provide an intermediate performance and can be robust, simple to implement and cost-effective.

Fibre spool-based stabilized lasers could bridge this performance gap by providing a robust solution whose performance sits in-between the ULE-based and the commercial lasers. At present, fibre spool-based lasers can provide a noise performance comparable to ULE-cavities, but their overall performance is plagued by a large drift due to the residual thermal sensitivity of the fibre itself.

The PhD project will target significant improvements in the stability of fibre spool-based stabilized lasers by exploiting the low thermal sensitivity of hollow-core Photonics Bandgap fibres manufactured at the ORC, University of Southampton. This could lead to the fibre spool-based stabilized lasers with stability below few tens of Hz/s, which could make this 'the technique of choice' for a variety of applications.

This PhD position is sponsored by NPL and Engineering and Physical Sciences Research Council (EPSRC) Case Conversion studentship awarded to the University of Southampton. The PhD is formally carried out at the University of Southampton in collaboration with NPL. Experimental work is to be carried at both institutions.

The studentship is **available to UK students only** (details regarding eligibility can be found [here](#)). Details about the PhD position advertised at the University of Southampton can be found [here](#) under 'Exploring the potential of optical fibres with low propagation delay sensitivity'.

The three-year scholarship on offer (to eligible students) comprises a tax-free stipend of £15,500 per year.

The successful candidate should have, or expect to have a Degree in Physics or Electronics Engineering.

Further details on the project can be obtained from Dr Giuseppe Marra (E: giuseppe.marra@npl.co.uk) or Dr Radan Slavik (E: r.slavik@soton.ac.uk).

Deadline for application: Wednesday 1 July 2015