



1 year postdoc position in AO control with Institut d'Optique (France) and possible extension to 1,5 year in collaboration with University Durham (UK)

Context: the Networking Activities in H2020 OPTICON project

In the framework of the Networking Activities of H2020 OPTICON European project, we propose a one year postdoctoral position in adaptive optics (AO) control, to be possibly extended to one year and a half (with Institut d'Optique Graduate School for one year, and possibly with University Durham (UK) for 6 month).

These networking activities aim at proposing new solutions and new tools for overcoming some of the current limitations of AO-assisted astronomical instrumentation. The proposed studies and developments can be divided in four main contributions, for which the OPTICON partners have already been at the forefront of international research for several years: characterization of the atmospheric turbulence, reconstruction of the point-spread function (PSF) of AO-assisted imaging, establishment of innovative control strategies for future AO systems, and on-sky demonstration of new AO concepts such as multi-conjugate and multi object adaptive optics (MCAO and MOAO) using the CANARY demonstrator on the William Herschel Telescope (WHT).

A key element of this network is a series of annual networking meetings, which will collocate plenary progress meetings, specialist meetings for study tasks and groups of subtasks, CANARY observation planning, PhD and postdoctoral training, and coordination meetings with other activities.

Tasks related to AO control led by Institut d'Optique and to Optical turbulence studies led by Durham University

- The Institut d'Optique leads the task related to **“Innovative control strategies for future adaptive optics systems.”** The increased complexity of future AO systems implies the development of innovative control strategies able to provide high performance at a reasonable computing cost. Promising techniques are currently in a research phase, some of which have been successfully tested on-sky in single conjugated, wide-field or extreme AO configurations, demonstrating their capacity to deliver significantly improved performance on complex AO systems. However, the E-ELT telescope environment (size, active and adaptive functions...) will raise new challenges for control.

Model-based approaches rely on static and/or dynamic priors on turbulence, vibrations and other perturbations, as well as on a good knowledge of the hardware components. Priors are generally identified on the data themselves, the identification procedures therefore being a key element in the process. Using wind profiles in the characterization of the model-based controller is an appealing strategy when dealing with frozen flow turbulence layers.

- University Durham leads the task related to **“Optical turbulence studies for Large Astronomical Telescopes.”** Outer scale of turbulence, stationarity of turbulence, turbulence evolution, wavefront data convergence and dome-turbulence monitoring and mapping is to be evaluated. The data resulting from this activity will also be directly applicable to the VLT and E-ELT instrumentation. This will enable strong collaboration with other on-going activities related to AO-assisted instrumentation such as the profiling requirements for modern ELT systems, instrument performance simulation and validation, high-performance control algorithms and tomographic reconstructor pre-computation and validation for wide-field AO.

Postdoc's activity description

The recruited postdoc will participate to:

1. The study of the impact of wind profiles on high-performance control strategies. This includes the development of advanced controllers, and the development or characterization of identification procedures needed to define model-based controllers.
2. The testing and performance evaluation using on-sky data (for instance CANARY) and end-to-end simulations;
3. If possible, the on-sky validation (using CANARY) of these improved control strategies along with their in-operation-tunable identification procedures;

Locations

Institut d'Optique Graduate School
2 avenue Augustin Fresnel
91120 Palaiseau, France

Durham University
Department of Physics
Durham, United Kingdom

The research will take place at Laboratoire Charles Fabry, Institut d'Optique – CNRS and at University Durham if the extension to 18 months is confirmed.

Contact and application

Please send your CV and motivation letter to

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Starting date and duration

The position will be open from 1st October 2017.

The duration is 1 year, with a possible extension to 1,5 year.

Remuneration

The remuneration will be fixed according to the postdoctoral experience of the applicant. The minimum net salary is about 2 k€ per month for the 1st year.