FOCUS
Focal Plane Array for Universe Sensing
https://labexfocus.osug.fr/

LAM
LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE
www.lam.fr

– Post-Doctoral Position –

Pushing Wide-Field Adaptive Optics toward visible wavelengths

Supervisor: Benoit Neichel
Institution: Laboratoire d'Astrophysique de Marseille (LAM)
Email: benoit.neichel@lam.fr
Phone number: +33 4 91 05 69 93

Funding: 24 months (FOCUS)
Starting Date: September – December 2016

Context: Adaptive Optics (AO) aims at compensating the quickly varying aberrations induced by the earth's atmosphere, and restore images at the diffraction limit of current large telescopes. AO observations have brought some of the major discoveries in astronomy with, among others, detailed study of the massive black hole at the center of our Galaxy, detailed images of the surface of solar systems planets, or precise morphology and dynamics of very distant galaxies.

Recently, the advent of a new generation of AO systems called Wide Field AO (WFAO) marked the beginning of a new era by significantly increasing the field of view of the AO-corrected images, and the fraction of the sky that can benefit from such correction. Where the first AO systems were well suited for observations of bright and relatively compact objects, the new generation of WFAO is opening the path for a multitude of new science studies. In addition, within a decade, the world will see a new generation of telescopes with diameter up to 39m, called the Extremely Large Telescopes (ELTs). The scientific potential of these giants relies on challenging new AO concepts, integrated inside the telescope itself, and providing high-resolution images to all the instrumentation downstream.

Current AO systems are however, mostly limited to corrections delivered in the Near Infra-Red. Pushing the corrections toward visible wavelengths, providing diffraction-limited images on medium field-of-view (15" to 30"), and with reasonable sky coverage would represent a unique science niche for 8m telescopes in the ELT era. Indeed, with a first light foreseen before 2025, it would represent an ideal replacement for HST, and cover a parameter space that would not be covered by any of the ELTs first light instruments. However, pushing AO wide-field correction toward visible wavelengths requires new observational strategy and challenging development in concepts and technologies. The post-doctoral work proposed will be at the center of these developments.

Post-docotoral work: The first part of the post-doctoral work will be to explore, in close collaboration with astronomers, the potential science cases and how they translate in top-level requirements for a visible WFAO system. The output of this study should be, in terms of system high-level specifications for a competitive 3rd generation AO instrument, figures and science trade-off on performance, sky coverage, wavelength coverage and corrected field of view.

Based on the scientific requirements, the second part of the work will be to draw the main system characteristics and trade-offs required to reach the science goals. A particular focus on the WFS strategy and impact of different detector technology will be explored in that part of the study. Different tomographic strategies may also be explored.

Finally, the third aspect concerns the requirements and strategy definition for the science path. Indeed, pushing performance toward visible wavelengths will not be possible without embedded and efficient post-processing methods. For instance, being able to capture short-exposure science images, would allow retrieving the ultimate performance by compensating the residual turbulence aberrations that would not be compensated by the AO system.

The main course of the project will be developed at LAM, with strong collaborations with ONERA, ESO and INAF-arcetri. The team working on this project includes Thierry Fusco, Laurent Mugnier (ONERA), Simone Esposito, P. Spano (INAF-Arcetri), Joel Vernet (ESO). Regular visits, and period of stays within the different institutes will be required during the post-docotoral work.

Profile:
We search highly qualified individuals with a Ph.D. in astronomy, physics, applied mathematics, engineering or other relevant fields. The post-doc will be integrated in a team of astronomers and AO experts, at the interface between new astrophysical data, data processing and instrumentation.

Our fellows have access to a wide range of facilities, a highly qualified team in high-angular resolution, and privileged collaborations with international teams.

Please follow http://lam.fr/recherche-14/optique-instrumentation/?lang=en for general instrumentation activities at LAM and http://lam.fr/recherche-14/optique-instrumentation/article/optique-adaptative specifically for adaptive-optics.

Application:

Applicants should email (single pdf file)
- a curriculum vitae and a list of publications;
- a one page motivation letter;
- a short research statement describing past achievements and future projects

to benoit.neichel@lam.fr

Also please arrange for letters of reference (pdf) to be e-mailed and indicate the contact details of up to 3 reference persons.

Applications sent before 1 May 2016 will be given full consideration. Past this date applications will be considered depending on availability. LAM and the University of Aix-Marseille are actively committed to equal opportunity in employment.

Benefits:
Gross salaries range between ~30k€ and 35k€ /year depending on previous experience and are subject to income tax and other deductions.
Funding is available for travels/missions/conferences (national/international).
Candidates are covered by the French Social Security.