

# Post doc in optical design

## Innovative optical design for the next generation of giant telescopes

<b>Position</b>	<i>Post doc</i>
<b>Duration</b>	<i>2 years + optional 3<sup>rd</sup> year</i>
<b>Institution &amp; Team</b>	<i>Laboratoire d'Astrophysique de Marseille, France, R&amp;D-optics group</i>
<b>Website</b>	<i><a href="http://www.lam.fr/optique-instrumentation">www.lam.fr/optique-instrumentation</a></i>
<b>Contact</b>	<i>Emmanuel Hugot (LAM), <a href="mailto:emmanuel.hugot@lam.fr">emmanuel.hugot@lam.fr</a></i>

### 1. General information

We are seeking for excellent and strongly motivated candidates for a two to three years position at LAM.

The position is funded by the ERC 5-years program "ICARUS - towards cost effective astronomical instrumentation". Additional details on the full work program are available here:

<https://www.lam.fr/pole-r-d/programmes-d-excellence/article/erc-stg-icarus>

The participant will be part of the R&D-optics group, and will work in direct interaction with a team of 5 people: one researcher, one other post doc, two PhD students and one engineer, for the duration of the stay.

This position is the central activity of the research program, so that the post doc will play a crucial role in the development of the research program, the definition of roadmaps, the orientation of technologies.

The post doc will thus have the opportunity to train her/his skills in supervision, management and lead of a scientific program.

The position comes with an attractive salary as well as environment costs for travels, software licenses and experiments.

### 2. Objectives, scientific approach

*Aim:* The aim of the proposed work is to enable a new set of optical complex systems using **emerging technologies** and offering **new functionalities**. The outcomes of this work are very exciting in terms of possibilities that are offered and will drive the work to be done by the rest of the team, by proposing and specifying a set of needs, breakthrough functionalities and manufacturing challenges.

*Tools and work plan:* The activity proposed here will be undertaken by the post doc, expert in optical design and simulations for imagers and/or spectrographs, able to handle the new challenges in the field of astronomical instrumentation for the next generation of giant telescopes, either ground-based or in space.

We plan to make extensive simulations using the Zemax software, and to develop specific routines in order to overcome potential issues not covered by the commonly used versions.

The development of specific modules will require a strong background in coding for optics, and will allow to pass beyond the classic approach of optical systems design and optimization by delivering clear operational boxes to include

- (i) the functionalities of **active mirrors**,
- (ii) the different descriptions of **freeform optics** (as done by Forbes for instance)
- (iii) get use of the possibilities offered by **curved detectors**

The basic approach will be to revisit current optical designs proposed for the next generation of telescopes, and to increase the performance of the most demanding without considering any barrier on the different parameters characterizing an optical system: F-ratio as low as possible, very large fields, extreme shape of freeform optics, curved controllable detectors, deformable optics.

The innovative approach will be done by exploiting the capacities of new components, to propose new functions such as off axis zoom systems including active mirrors and curved detectors, or flexible multi-pupil imaging taking advantage of deformable detectors and flexible micro-lenses arrays.

*Expected results:* The expected results of this work are not only optimized compact designs using emerging components, but also the associated specifications, giving entries for the rest of the team that will work on the emergence of new manufacturing technologies.

### 3. Candidates profiles

The candidates must have a PhD in physics, optics or astrophysics, and must have strong skills in optical design and simulations. The major part of the coding will be done in Python.

The candidates must be open to the use of new approaches and new technologies, to propose creative systems covering a broad range of applications.

Skills in experimentation will be an asset, as the work program will lead to the realization of prototypes and their characterization.

### 4. Application

Candidates must send a letter of intent, as well as an academic curriculum vitae.

Supporting letters from former supervisors will be much appreciated and will help in the evaluation.

We ensure equal opportunity for the applicants regarding gender, origins, religions or orientations.