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# Call for paper — European Journal of Control

## Adaptive optics control for ground based telescopes

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Adaptive Optics (AO) is used in astronomy to compensate for the wavefront deformations induced by atmospheric turbulence, which is the major factor limiting the resolution of ground-based telescopes. A Deformable Mirror (DM) is inserted into the telescope's optical path, and controlled in real-time using measurements of the residual phase deformation provided by a WaveFront Sensor (WFS) measuring the WF on a Guide Star (GS). AO is now routinely used on large telescopes, enhancing their effective resolution by more than an order of magnitude.

New refinements of the original AO concept have been proposed. Wide field AO is based on the coordinated use of several DMs and WFSs to estimate and correct turbulence in the volume, thus enabling to reduce anisoplanatism. In Multi-Conjugate AO (MCAO), several DMs are conjugated in altitude to achieve correction over the whole width of the Field of View (FoV). Variations on this concept include MOAO, for the observation of many small objects scattered over a very wide FoV, LTAO for the observation of one small faint target away from GSs, *etc.*

In the meantime the concept of XAO for high-contrast imaging of exo-planets has emerged. The design of high performance AO systems is recognized as a crucial challenge to be addressed in order to achieve the requested performance level for future telescopes, including extremely large telescopes featuring up to several thousands degrees of freedom. As a result, AO has emerged as a source of challenging multivariable control design and modeling/identification problems.

The special issue is focused on AO control for ground-based telescopes. Contributions are expected on, but not limited to, the following subjects:

- Optimal and robust control for AO
- Control-oriented modeling of turbulence, DM and WFS
- AO control for DMs with dynamics, woofer-tweeter, actuator saturation
- Model identification and calibration for AO
- DM surface control
- Fusion of Natural and Laser Guide Star WFS measurements
- Control of Wide Field AO systems
- On-line identification and controller tuning for AO
- Real-time algorithms for strongly multivariable AO systems (high number of DoF)

Papers must be submitted **no later than December 1<sup>st</sup>, 2009** to the EJC address [ejc@elet.polimi.it](mailto:ejc@elet.polimi.it) (according to instructions at <http://www.elet.polimi.it/ejc/>). The papers must be in pdf form accompanied by a letter with a clear statement that the paper is meant for the special issue "Adaptive optics control for ground based telescopes" and has not been submitted elsewhere. All papers will be peer reviewed according to EJC's standards.

Guest editors

Caroline Kulcsár            Henri-François Raynaud  
L2TI, Institut Galilée  
Université Paris 13  
Villetaneuse, France  
{[caroline.kulcsar](mailto:caroline.kulcsar@univ-paris13.fr), [raynaud](mailto:raynaud@univ-paris13.fr)}@univ-paris13.fr

Jean-Marc Conan  
Dpt d'Optique Théorique et Appliquée  
ONERA,  
Châtillon, France  
[conan@onera.fr](mailto:conan@onera.fr)