

# MARCO BONAGLIA, PhD

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Postdoc researcher at INAF – Arcetri Observatory, working in the field of astronomical Adaptive Optics since 2006. I'm actually the system engineer of the NGS WFS module of MAORY, the EELT MCAO facility. I've been system engineer of the LGS WFS of ARGOS, the LGS-based GLAO system of the LBT. Between 2012 and 2017 I've been responsible for the commissioning of the 2 LGS WFS at the telescope and I actively contributed to the calibration, debug and test on sky of the GLAO functionality with the 2 LUCI instruments both in imaging and MOS modes. I'm also contributing, as optomechanical engineer, to other astronomical instrumentation projects: GMT-NGSWFS, LBT-FLAO and SOUL, EELT-HIRES and VLT-ERIS and VLT-MAVIS proposal. During my career I coordinated the activity of research teams of up to 3 people (MSc and PhD students).

## EDUCATION AND TRAINING

**February 2009 – January 2012**

**PhD in Astronomy at University of Florence, Department of Physics and Astronomy**

Thesis: "The wavefront sensor unit of ARGOS, the LBT laser guide star facility", Supervisor: Prof. A. Righini

**March 2005 – October 2007**

**Master in Science at University of Bologna, Department of Astronomy**

Thesis: "Liquid crystal tunable filter for ELT cophasing", Supervisor: Prof. B. Marano

**September 2001- March 2005**

**Bachelor's degree at University of Bologna, Department of Physics**

Thesis: "Superluminal motions in AGN", Supervisor: Prof. G. Giovannini

## MAIN RESEARCH ACTIVITIES

### ARGOS, the LGS-GLAO system of LBT

This project represented the core of my research activity between 2009 and 2017. My main duties have been:

- To study the performance of the LGS-GLAO system with end-to-end numerical simulations (CAOS) in preliminary and final design phases (2009 – 2010).
- Responsible for the design of the LGS WFS: opto-mechanical design finalization, tolerance and finite element analyses, production specification definition (2009 – 2011).
- Responsible for the MAIV of 2 units of the LGS WFS and of the dichroic beam-splitters (2012 – 2014).
- To define and implement the alignment procedure for the LGS WFS and dichroic at LBT (2014).
- To optically calibrate the 2 LGS WFS with the LBT adaptive secondaries (2012 - 2017).
- To develop and debug the acquisition and guiding procedures for the LGS on-sky (2014 – 2015).
- To evaluate the performance of the GLAO system with the 2 LUCI both in imaging and MOS observing modes (2014 - 2016).
- To support the astronomical observations carried out in shared risk with LUCI/ARGOS (2017 – today).

### MAORY, the MCAO system of EELT

I've been involved in MAORY since 2016 as optomechanical engineer of the NGS WFS sub-system. Since 2018 I am also responsible for the NGS WFS workpackage, with system engineer duties and coordinating the

activity of 4 people between Arcetri and Teramo observatories. I am also member of the MAORY and MICADO astrometric working group since 2017.

### **SCAO systems of LBT (SOUL and FLAO)**

I participated to the development of the FLAO pyramid WFS optomechanics since its AIV phase in Arcetri (2009). Starting from 2014 I am been responsible for the upgrade of the optomechanical design of the WFS to increase the sampling to 40x40 subapertures (SOUL project). I also contributed to the AIV and commissioning of the SOUL components at LBT(2017 -2018).

### **MAVIS, the visible MCAO system of VLT**

I am been involved in the pre-phase A study for this system since 2017, with optomechanical engineering duties and contributing in sketching out a possible layout of the AO bench, the NGS and LGS WFS.

### **Co-phasing Pyramid WFS (APE at VLT)**

I was involved in this project at the time of MSc thesis, between 2006 and 2007. I developed a new co-phasing technique based on wavelength sweeping and the usage of a liquid crystal tunable filter aiming to solve the phase ambiguity problem, so increasing the capture range of the pyramid phasing sensor up to tens of microns. This technique was also successfully tested and validated on sky at the WHT.

## **LIST OF SELECTED PUBLICATIONS**

1. E. P. Farina, inter alios M. Bonaglia, Resolving the host galaxy of a distant blazar with LBT/LUCI 1 + ARGOS, MNRAS, Volume 476, Issue 2, p.1835-1839
2. M. Brusa, inter alios M. Bonaglia, Molecular outflow and feedback in the obscured quasar XID2028 revealed by ALMA, Astronomy & Astrophysics, Volume 612, id.A29, 15 pp.
3. M. Perna, inter alios M. Bonaglia, LBT/ARGOS adaptive optics observations of  $z \sim 2$  lensed galaxies, Astronomy & Astrophysics, in press (eprint arXiv:1806.10211)
4. S. Rabien, inter alios M. Bonaglia, ARGOS at the LBT Binocular laser guided ground layer adaptive optics, Astronomy & Astrophysics, in press (eprint arXiv:1806.09938)
5. S. Rabien et al., ARGOS - The laser guide star system for the LBT, Proceedings of SPIE - The International Society for Optical Engineering 7736, art. no. 77360E
6. S. Esposito et al., Wavefront sensor design for the GMT natural guide star AO system, Proceedings of the SPIE, Volume 8447, article id. 84471L. ISBN: 9780819491480
7. M. Bonaglia, L. Busoni, T. Mazzoni, et al., Pre-shipment test of the ARGOS laser guide star wavefront sensor, Proceedings of the SPIE, Volume 9148, article id. 91485G
8. M. Bonaglia, et al., Laboratory characterization of the ARGOS laser wavefront sensor, Proceedings of the SPIE, Volume 8447, article id. 84476B. ISBN: 9780819491480
9. M. Bonaglia, et al., First cophasing of a segmented mirror with a tunable filter and the Pyramid wavefront sensor, Proceedings of SPIE - The International Society for Optical Engineering 7739, art. no. 77392Y
10. M. Bonaglia, et al., Large capture range cophasing with the liquid Crystal tunable filter, Proceedings of SPIE - The International Society for Optical Engineering 7012, art. no. 70123C