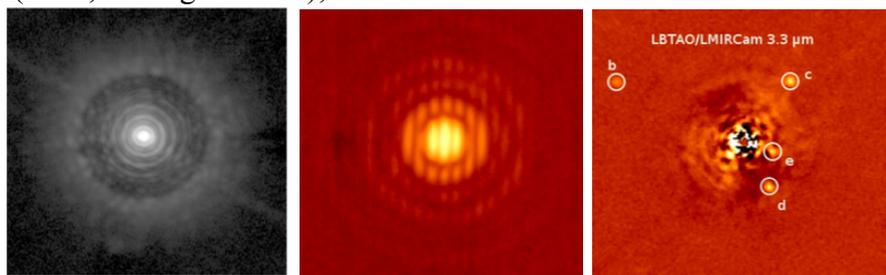


## Employment and Positions

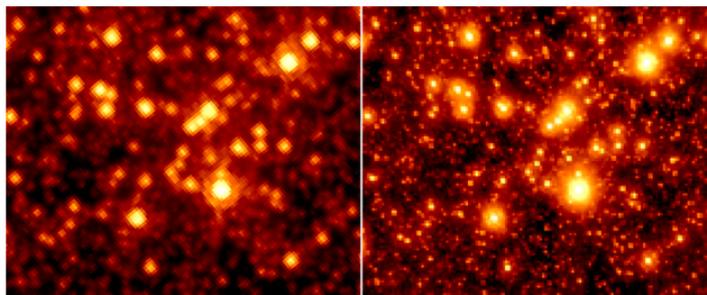
- February 1991, graduated in Physics, Università di Firenze.
- February 1995, appointed as tecnico laureato, Osservatorio di Arcetri.
- November 1995, graduated Dottore di Ricerca in Astronomia.
- 1 May 1998, appointed as Ricercatore Astronomo, Osservatorio di Arcetri.
- 1 May 2003, appointed as Astronomo Associato, Osservatorio di Arcetri.
- 1 August 2017, appointed as Dirigente di Ricerca, Osservatorio di Arcetri

## Original contributions to Adaptive Optics

- Development of pyramid wavefront sensors and adaptive secondary mirrors for national and international observing facilities like TNG, LBT, VLT, Magellan, GMT, E-ELT, TMT, (1996-present);
- First on sky observations with an Extreme Adaptive Optics system FLAO@LBT (2010, see Fig.1 left and right);
- First Fizeau interferometric images with Adaptive Optics with LBTI@LBT (2012, see Fig.1 center);



**Figure 1** Left: Diffraction limited images of FLAO system at LBT providing, for the first time in ground based 8m class telescopes SR in excess of 80% at H band (more than 10 diffraction rings visible in the image), center LBTI fringe pattern after correction of LBTI AO systems, right: the 4 planets of HR8799 as resolved in H band at the LBT telescope using FLAO.



**Figure 2** 20x20 arcsec image of globular cluster M92 with HST WFPC (left) and LBT FLAO (right). Integration time is 20min HST and 8min for FLAO. The improved quality in the FLAO image is clearly visible, the overall # of detected star is 4 times larger with FLAO, limiting magnitude is 2 magnitudes fainter.

## Main National and International projects

- Principal investigator (PI) (October 2001 to September 2012) of twin adaptive optics systems for the LBT telescope (FLAO1 and FLAO2@ LBT). The FLAO system has been defined the "...*The current state of the art*..." in the Annual Review of Astronomy & Astrophysics (Davies & Kasper, 2012) by R. Davies and M. Kasper.
- Co-PI and AO instrument Scientist of the VLT/UT4 instrument ERIS (Enhanced Resolution Imager and Spectrograph) from 2014;
- Co-PI of the MAORY AO system first light instrument for the European Extremely large Telescope (E-ELT, ESO), from 2018
- Co-PI of the Ground Layer AO system ARGOS for the LBT telescope (from 2006-2013)
- Co-PI for the Preliminary Design Study for the natural guide star wavefront sensor of Giant Magellan Telescope (2012-2015);
- Co-I for the ESO/MAVIS Phase A study for a LGS based MCAO instrument for visible wavelength. Consortium Phase A proposal accepted by ESO (11/18), KoM planned February 2019.
- Co-Proposer of the Pyramid wavefront sensor of the TMT NGS AO system, (2016) accepted as baseline by TMT PO;
- Italian responsible (PI L. Close) for design and realization of the adaptive Optics system for the 6.5m telescope Magellan, Las Campanas, Chile (2009-2012);
- Italian responsible (PI P. Hinz) for design and realization of the adaptive Optics system for the interferometric instrument LBTI of LBT telescope (2007-2012)
- Italian responsible for two EU funded network named "LGS for 8m class telescopes [1997-2001]" and "AO for Extremely Large Telescopes" [2000-2005];
- Member of E-ELT development supervisory panel ESC (from 2012)

## Conference and seminars

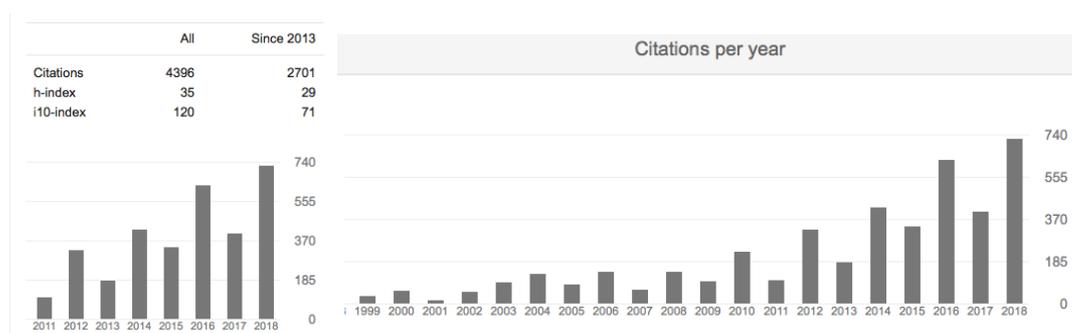
- Program committee member, invited speaker and session chair in more than 20 international conferences including the last 4 AO4ELT conferences and the last 4 SPIE Astronomical Instrumentation;
- Editor and chair of 3 adaptive optics international conferences and workshop (BCAO 2001 & AO4ELT3 2013, WFS in the VLT ERA, 2017);
- Plenary speaker at the SPIE "Optics & Photonics", San Diego, August 2011; the related article has been the top downloaded article in SPIE digital library Astronomy section from July 2011 to April 2012.
- Invited Speaker for many different seminars at various international institutions like European Southern Observatories (ESO), Laboratoire d'Astrophysique de Marseille (LAM), Organisation Nationale de Etudes et Recherche Aérospatiale (ONERA), NUI Galway University, Ireland, Gemini South Headquarters (La Serena, Chile), Steward Observatory (UoA),

## Academic activities

- Lecturers at University of Florence, 2018 (semestral standard course of 48 hours);
- Lecturer in several National and International Doctorates and PostDoc schools for Adaptive Optics;
- Supervisor of 7 degree thesis in Physics/Astronomy and Engineering;
- Supervisor of 7 PhD thesis;
- External reviewer and supervisor of 5 international doctorate degree;
- Supervisor of 6 EU funded post Doc fellowships and of about 2 post-coc per year from 2010;
- Science Foundation Ireland Visiting Professor at Galway University (NUI), 2004;
- Visiting Scholar at Steward Observatory, AZ (USA), 2010;
- Visiting Scientist at Herzberg Institute for Astrophysics, Canada, 2014;

## Publications and Citations

Dr. S. Esposito is author and co-authors of 282 publications: 51 referred, 231 proceedings. A brief statistics form Google Scholar is reported below.



## Brief Bibliography

Dr. S. Esposito started working in Adaptive Optics in 1995 taking part to the design and development (1996-2003) of the AO system for Italian 3.5m telescope TNG located in Canary Islands. In this context he dedicated mostly to the analysis, design and development of the newly proposed Pyramid Wavefront Sensor. Following this activity he was appointed in 2001 as PI of the natural guide star based Adaptive Optics System for the Large Binocular Telescope (FLAO). The development of such system required about 10 years and successfully demonstrated its capabilities in May 2010 as briefly discussed below. Since 2010, he is the leader of the AO group of the Arcetri Observatory that consists on average of 20 members equally divided between staff and temporary members. The group is currently recognized among the leading group in the international AO context. Dr. Esposito has been PI of several internationally relevant AO projects including the two FLAO systems for the LBT telescope. The FLAO systems implemented two key elements of today Astronomical AO systems namely the adaptive secondary mirrors and the pyramid wavefront sensor. The systems achieved in May 2010 diffraction limited images of quality never achieved previously (SR>80% in H band, contrast ration of  $< 10^{-4}$  at 300mas

radius). This successfully on-sky operation lead the Adaptive Optics community to the adoption of adaptive secondaries and pyramid sensors on most of the existing AO systems and telescopes like VLT, Magellan, GMT and TMT. In particular such elements are used in the AO systems currently in design phase for the 3 first light instruments of the E-ELT namely HARMONI, MICADO/MAORY, METIS. In addition to the LBT work Dr. S. Esposito is currently Co-I of the new VLT instrument ERIS where he is Instrument Scientist for the instrument AO module. The ERIS AO module is currently in the integration phase in Arcetri after successful PDR (February 2016) and FDR (May 2017). The ERIS Paranal commissioning phase is planned for June 2020. Always considering the 8m class telescopes Dr. Esposito is currently involved personally and as the Arcetri AO group leader in various other international AO projects like Keck NIR PWFS and Magellan MagAO 2k. In the VLT case he is Co-I of the new proposed VLT instrument MAVIS an LGS based MCAO system for visible wavelength using the adaptive secondary of the VLT UT4 (1172 actuators) and the 4 LGS of the AOF. In the 40m class telescopes he is onvolved in the AO system design for all three ELT. In particular (1) he has been responsible for the preliminary design of the Natural Guide star SCAO system of GMT (01/12-07/13, 03/13-03/15) based on a pyramid sensor, (2) he is Co-I of the first light instrument of the E-ELT called MAORY the LGS based MCAO module for infrared wavelengths serving MICADO the first light spectro-imager of the E-ELT (3) is has been Co-Proposer together with J.P. Veran and G. Herriot of the TMT NGS Pyramid wavefront sensor design that has been accepted by TMT PO. In terms of international service activities he is conference chair and program committee member in many different international conferences (in particular he is program committee member of the SPIE AO conference since 2012) and of the last 4 AO4ELT conferences. From Marc 2014 he was appointed by ESO Director General Prof. T. De Zeeuw to serve as member of the E-ELT Scientific Committee (ESC) a subcommittee of ESO-STC dedicated to the supervision of ELT design and construction. Finally Dr. Esposito is currently a lecturer of the University of Florence with a lecture course on Adaptive Optics for Astronomy.