ISSUE 28 | 2023

INAF
ISTITUTO NAZIONALE
DI ASTROFISICA

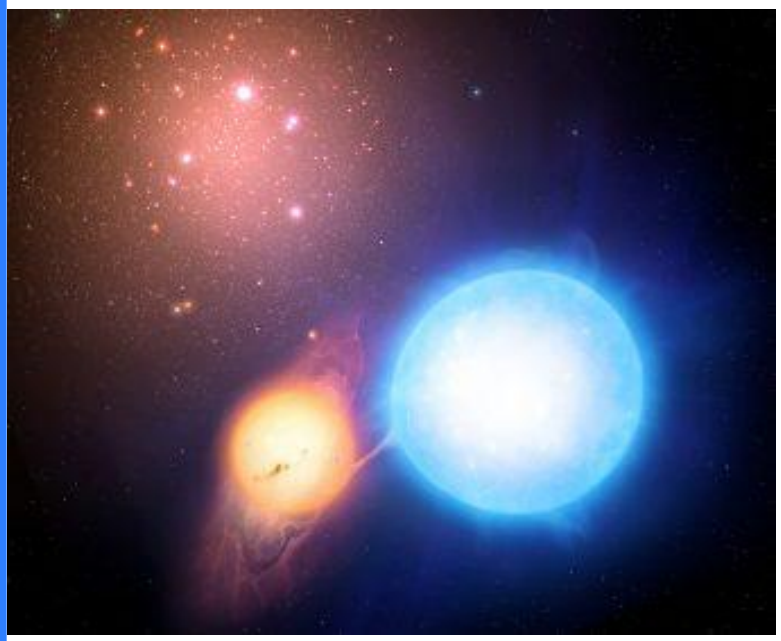
MONTHLY NEWSLETTER

INAF Osservatorio Astrofisico di Arcetri

HIGHLIGHT

The project ***StarDance*** (PI: Elena Pancino, INAF Arcetri) has been funded by the European Research Council with an Advanced Grant of € 2.5 million for a period of 5 years (starting from Nov.1st 2023).

INAF press release



Credits image: Mark A. Garlick/University of Warwick

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PROJECTS and PROGRAMS

ALMA LARGE PROGRAMS

Cycle 10

Link: https://almascience.eso.org/alma-data/lp

UNIC

UNveiling the Initial Conditions of high-mass star-formation (UNIC)

PI: Elena Redaelli (Max Planck Institute for Extraterrestrial Physics)

Co-I: **D. Galli**, **M. Padovani**, **G. Sabatini** (INAF-OAA)

COMA

The Large 12P COMA survey (COmetary Molecules with ALMA)

PI: Martin A. Cordiner (NASA)

Co-I: **M. Lippi** (INAF-OAA)

INAF GRANTS

Link:http://www.inaf.it/it/sedi/sede-centrale-nuova/presidenza/decreti/archivio_dec/decreti-2023/all.1-al-decreto-38-2023

LARGE GRANTS

Beyond metallicity: Exploiting the full POtential of CHemical elements (EPOCH)

PI: **L. Magrini**

DATA ANALYSIS GRANT

Quasars in public archives: a treasure 35 trove in plain sight

PI: **E. Nardini**

Machine Learning for Adaptive Optics

PI: **G. Agapito**

GO-GTO Normal

The origin of cool cores and the evolution of BCGs in galaxy clusters

PI: **P. Tozzi**

Exploiting ALMA data to study planet- forming disks: preparing the advent of SKA (PROTO-SKA)
PI: **C. Codella**

TECHNO GRANTS

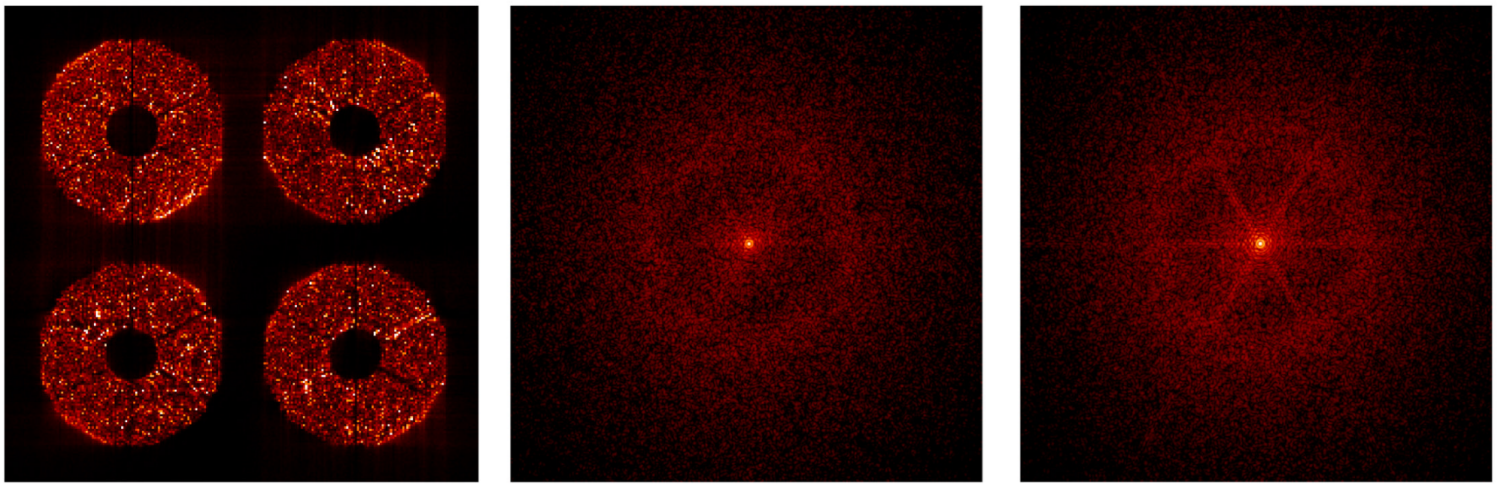
Super-Resolution in Astronomy: Development and Tests of Technologies for the INAF Radio Telescopes
PI: **L. Olmi**

THEORY GRANTS

MultiwavelEngth signatuRes of Cosmic rAys in sTar-fOrming Regions (MERCATOR)
PI: **M. Padovani**

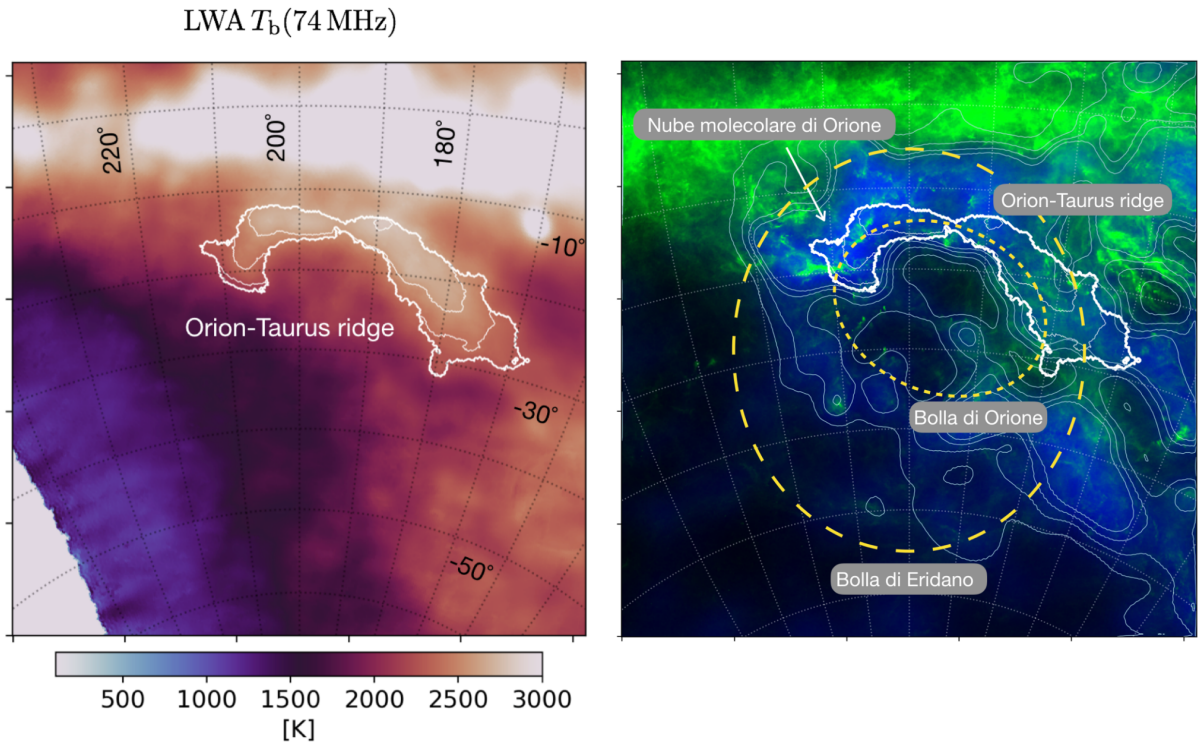
REFEREED PUBLICATIONS

G. Agapito, E. Pinna, S. Esposito, C. Taïssir Heritier, S. Oberti
Non-modulated pyramid wavefront sensor: Use in sensing and correcting atmospheric turbulence
Astronomy & Astrophysics (2023), 677, A168
Media INAF: Dalle piramidi alle stelle



Credits: Agapito et al. 2023

A. Bracco, **M. Padovani**, J. D. Soler
The Orion-Taurus ridge: A synchrotron radio loop at the edge of the Orion-Eridanus superbubble
Astronomy & Astrophysics (2023), 677, L11
Media INAF: L'Arco di Orione ai bordi della Bolla di Eridano



Credits: Bracco et al. 2023

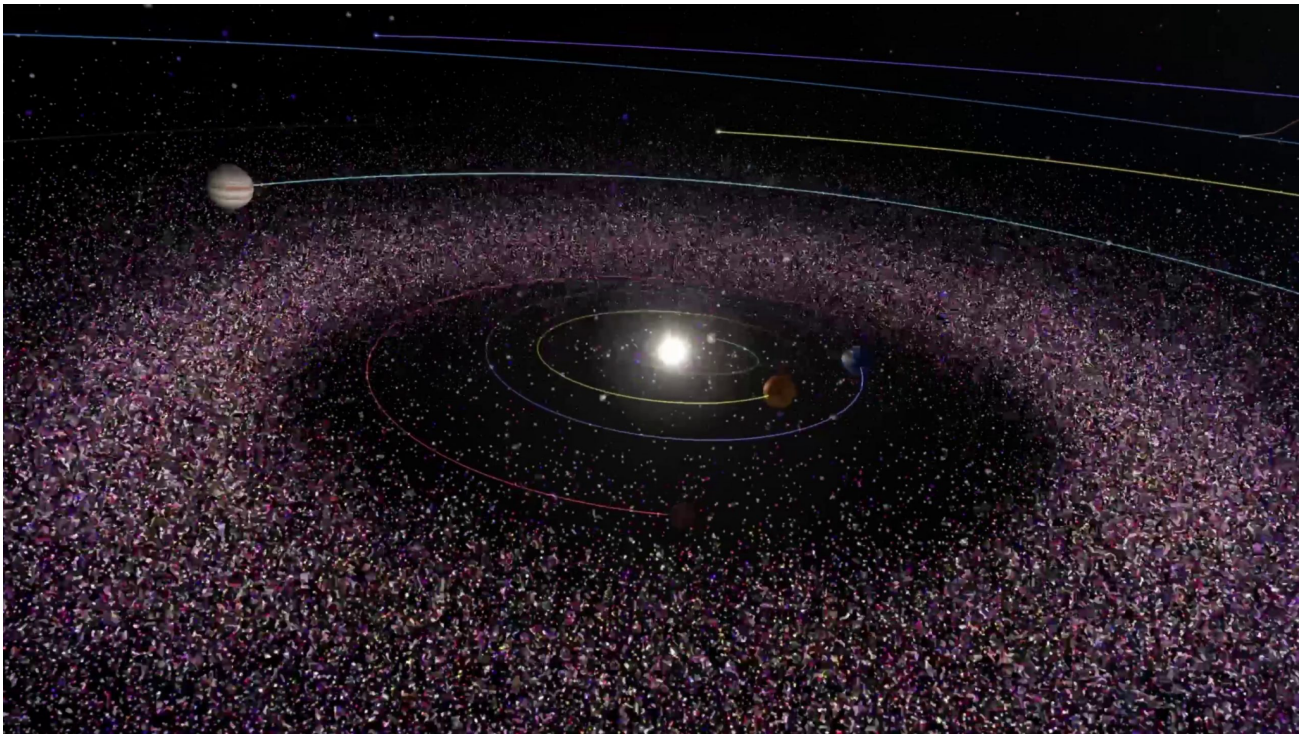
L. K. Hunt, **F. Belfiore**, **F. Lelli**, B. T. Draine, **A. Marasco**, [...], **M. Beltrán**, A. Concas, **G. Cresci**, M. Ginolfi, N. Kumari, **F. Mannucci**
Gas, dust, and the CO-to-molecular gas conversion factor in low-metallicity starbursts
Astronomy & Astrophysics (2023), 675, A64

G. Kyriakou, **P. Bolli**, L. Mezzadrelli
Suppresion of Log-Periodic Dipole Antenna Spurious Radiation by Lumped Element Loading for Radioastronomical Application
Radio Science (2023), 58, 8

E. Lusso, **E. Nardini**, M. Fumagalli, M. Fossati, F. Arrigoni Battaia, M. Revalski, M. Rafelski,V. D'Odorico, C. Peroux, S. Cristiani, P. Dayal, F. Haardt, E. K. Lofthouse
The MUSE Ultra Deep Field (MUDF). IV. A pair of X-ray weak quasars at the heart of two extended Lyα nebulae
Monthly Notices of the Royal Astronomical Society (2023), 525, 3

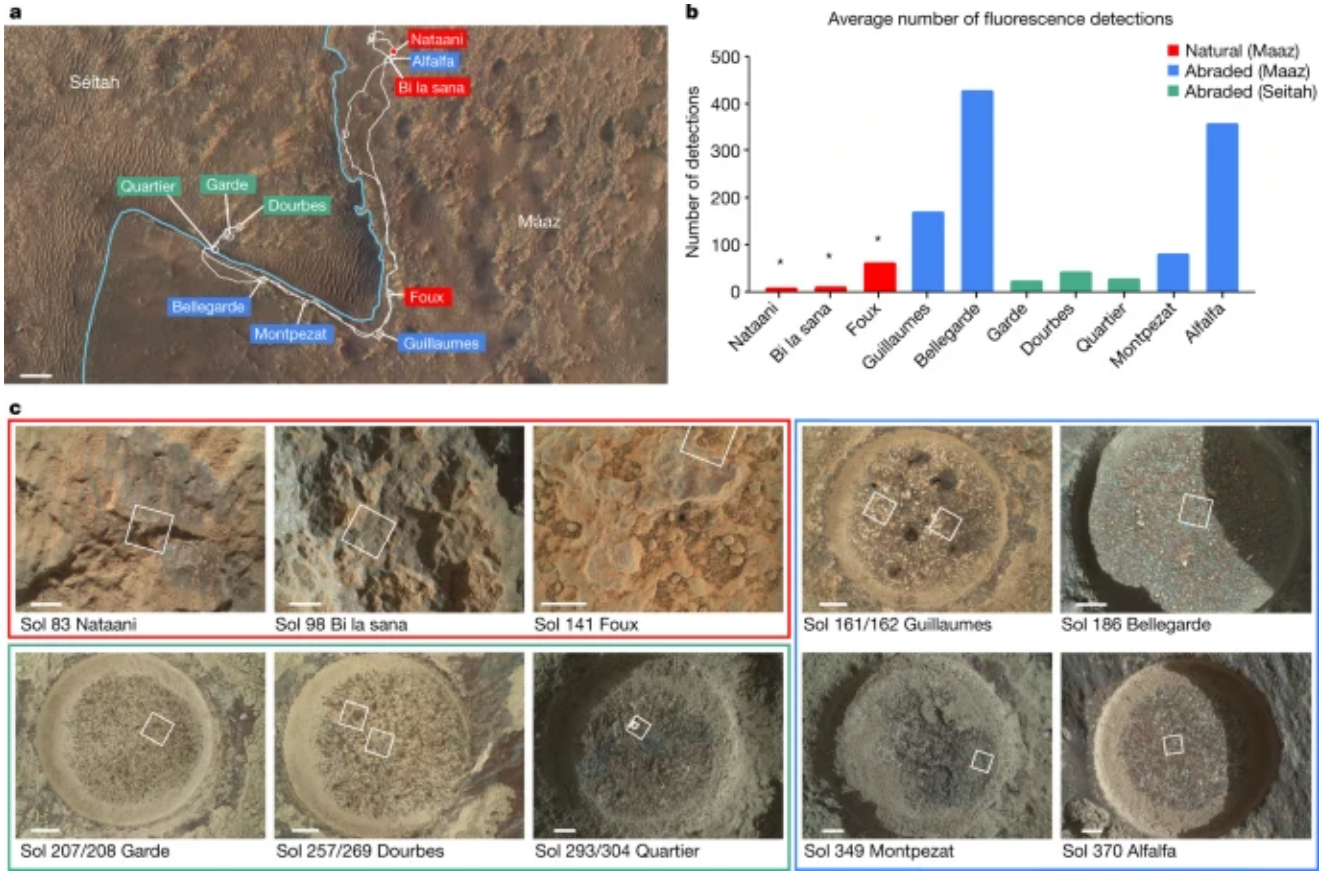
M. Signorini, G.Risaliti, **E. Lusso**, **E. Nardini**, G. Bargiacchi, A. Sacchi, B. Trefoloni
Quasars as Standard Candles. IV. Analysis of the X-ray and UV indicators of the disc-corona relation
Astronomy & Astrophysics (2023), 676, A143

Gaia Collaboration, P. David, [...] **A. Dell'Oro** et al.
Gaia Focused Product Release: Asteroid orbital solution. Properties and assessment
Astronomy & Astrophysics, in press
Media INAF: Gaia traccia 150mila asteroidi al millisecondo d'arco



Credits: ESA/Gaia

S. Sharma, [...], **T. Fornaro** et al.
Diverse organic-mineral associations in Jezero crater, Mars
Nature (2023), 619, 724–732
Media INAF: Molecole organiche nel cratere marziano Jezero



Credits: Sharma et al. 2023.

M. S. Väisälä, H. Shang, **D. Galli**, S. Lizano, R. Krasnopolsky
Exploring the Formation of Resistive Pseudodisks with the GPU Code Astaroth
Astrophysical Journal, in press

N. Hallakoun, [...] **F. Mannucci** et al.
An irradiated-Jupiter analogue hotter than the Sun
Nature Astronomy, in press
Media INAF: Grande come Giove, caldo più del Sole

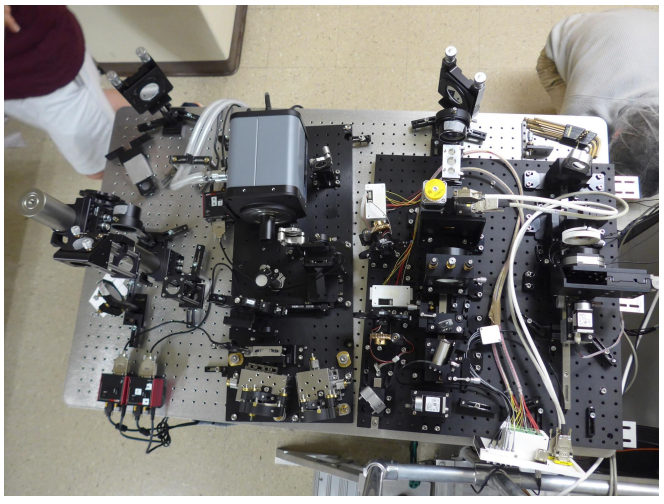
R. Middei, **E. Nardini**, G. A. Matzeu, S. Bianchi, V. Braito, M. Perri, S. Puccetti
Disc wind or disc line? The extraordinary Fe-K feature of Mrk 1513
Astronomy & Astrophysics, in press

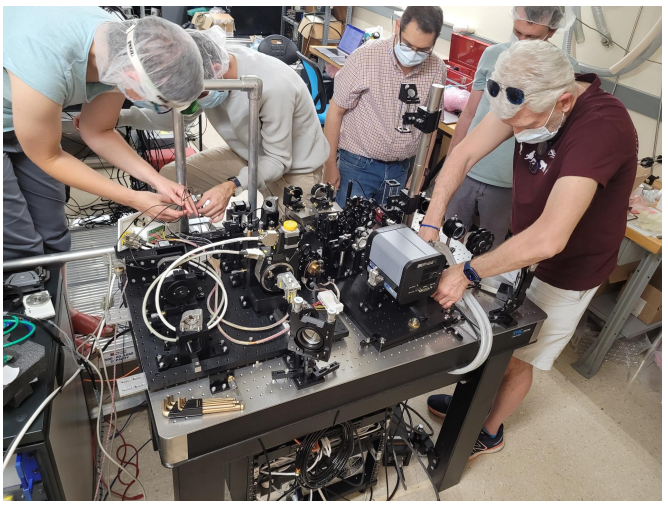
TECHNOLOGICAL MILESTONES

Adaptive optics tests for the Giant Magellan Telescope

The Arcetri Adaptive Optics (AO) group has been working since 2011 to the design and realization of the wavefront sensor unit for the GMT natural Guide Star Adaptive Optics system. The group has received three contracts from GMT Project Office for such a development in the period 2011-2023. The last contract has the goal to build a prototype of the wavefront sensor and test it in operation at the University of Arizona labs by using the extreme AO system named MagAO-X. The test will include a closed loop operation with a GMT telescope simulator including segmented pupil and piston sensing.
The full experiment includes (1) the pyramid wavefront sensor, developed by Arcetri, for the classical AO correction, (2) a Holographic Dispersed Fring Sensor (HDFS), developed by UoA and GMTO, that will maintain the telescope phasing during AO operation. The integration in Arizona was successfully done in July and the AO tests are ongoing right now.

Team: S. Esposito (PI), C. Plantet (System Engineer), E. Pinna (AO scientist), F. Rossi (Software engineer), G. Agapito (Control engineer), N. Azzaroli (Optical engineer), L. Carbonaro (Mechanical engineer), M. Bonaglia (AO scientist), A. Puglisi (Software engineer), M. Lauria (Administration manager), A.-L. Cheffot (AO scientist), T. Lapucci (Electronics engineer).





(Letf) Birdview of the prototype and relay optics. Right board: pyramid sensor. Left board: HDFS.
(Right) Last adjustments on the fully integrated prototype before going to the telescope simulator.

NEW ARRIVALS

FELLOWS

Nils Guillaume Francois Dani Candebat - I joined the Observatory to work on machine learning methods applied to the stellar domain. More specifically, I'm focusing on the estimation of stellar parameters and the generation of spectra from these parameters. As a machine learning enthusiast, I'm very interested in all the advances in this field, which are evolving very quickly. In particular, I'm looking at methods for measuring uncertainties to convince the reluctant of the benefits of these methods for science. To do this, I can rely on my two Masters degrees, one in astrophysics and one in numerical methods and artificial intelligence. **Supervisor: Germano Sacco.**

Thomas Nony - I am a researcher studying star formation in the Milky Way, on scales ranging from molecular clouds to protoplanetary disks. The main questions I am interested in the origin of stellar masses in (proto)clusters and the variability of protostellar ejections. I have experience with instruments and observations from the infrared to the cm-radio (JWST, Herschel, VLA) through the millimeter interferometer ALMA, which is at the center of my studies. My journey in astrophysics began with a PhD at IPAG (Grenoble, France), during which I started to work on high-mass star-formation. After a first postdoc at IPAG within the European project StarFormMapper, I got a fellowship for 3 years in Morelia (Mexico), during which I got more involved in the ALMA-IMF collaboration. While continuing to study high-mass proto-clusters, I have also adopted a complementary methodology, the comparison between observations and numerical simulations. At INAF-Arcetri, I will focus on molecular outflows in nearby, low-mass star-forming regions, in connection with protoplanetary disks. **Supervisor: Francesca Bacciotti.**

Giada Peron - I am a researcher working in high-energy astrophysics, and in particular I am

focused on gamma-ray observations from Galactic objects. The goal of my research is to investigate the origin of Galactic cosmic rays, the energetic particles that every second hit the Earth. I observe the gamma radiation that is produced in the interactions of the cosmic particles with the interstellar medium either near their sources (Supernova remnants, Stellar Clusters, etc.) or during their propagation. I got passionate about this topic during my master's thesis at the Max Planck Institute for Nuclear Physics in Heidelberg where I also obtained my doctoral degree. I am an expert in Fermi-LAT analysis (in the GeV energy band), but during my postdocs, first in Heidelberg and then in Paris (at the APC laboratory), I expanded my expertise to the TeV energy band, joining the H.E.S.S. and CTA international collaborations. In Arcetri, I will focus on stellar clusters to try to understand their role as cosmic-ray accelerators both through observations of existing detectors and helping in preparing the observations of the forthcoming ASTRI Mini-Array observatory. **Supervisor: Elena Amato.**

Evangelos Paspaliaris - I recently obtained a Ph.D. from the Aristotle University of Thessaloniki, having worked at the National Observatory of Athens. I mainly focus on the investigation of the interstellar medium, the stellar populations and the process of star formation in local galaxies. I use a wide range of multi-wavelength (far-UV to sub-mm) photometric and spectroscopic observations to explore how the physical properties of galaxies vary, as a function of their morphological type and their star-forming activity. I first delved into this research direction during my M.Sc. studies at the Niels Bohr Institute, at the University of Copenhagen studying Spitzer mid-infrared spectra of AGN-dominated and starburst-dominated galaxies. Later, during my Ph.D. studies I continued mainly with spectral energy distribution fitting analyses and also spectral synthesis, using data from galaxy surveys, such as DustPedia, GOALS and GAMA. Additionally, I am passionate about engaging in astronomy outreach activities. I am glad to be a member of the extragalactic group at the INAF-OAA.

Supervisors: Simone Bianchi, Edvige Corbelli.

TECHNOLOGIST

Alessandro Barucci - I am a Mechanical Engineer with thirty years experience mostly as sales manager of industrial refrigeration and automation companies, achieved by working both in large multinational groups and in Italian SMEs, carrying out my activity on the national market and above all abroad.

My favorite and proven professional interests are initiating a business and driving sustainable growth Passionate about Circular Economy, in the last years I have been trained on the ESG (Environmental, Social and Governance) topics and earned the certification of Sustainability Manager from RINA. Qualified mentor of innovative startups at UNIFI- University of Florence/ "Startup Success" - Federmanager Toscana and MIP Murate Idea Park incubators.

I joined INAF-OAA last July as project manager of the civil work for the renovation of an existing building located in the Arcetri area, within the PNRR-STILES Program/WP6000 National Testing Facilities.

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