

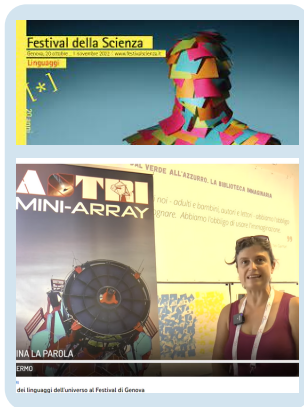
# B.O.M – BULLETIN OF THE MONTH

## OCTOBER 2022



INAF - IASF PALERMO

### EDUCATION & OUTREACH



• The **Science Festival** was held in Genoa from 20 October to 1 November 2022. This is an event for the scientific culture dissemination that over the years has become an international benchmark.

The **INDACO - INAF group for the dissemination of ASTRI and CTA Observatory** participated with the Astrophysics, Cosmology and Space workshop "**Discovering the Languages of the Universe - Galactic Puzzles to reconstruct Centaurus A**". Our **Valentina La Parola**, one of the creators of the workshop, was also present at the activities held at the "Edmondo De Amicis" International Children's Library - Porto Antico Area. Media Inaf interviewed her:

<https://www.youtube.com/watch?v=9TRCD70qNns>

### PARTICIPATION IN CONFERENCES AND SEMINARS



• On 27 October, **Angelo Adamo** attended the 21st **Annual Conference of the Italian Society of Archaeoastronomy**. In his contribution entitled "**The notes of black bile - Saturn and the musical description of melancholy**", Adamo analysed a number of representations of melancholy - a sentiment that in ancient times was believed to be linked to the very existence of the planet Saturn - taken at the intersection of texts, still images of the planet, its moving images (films) and music, in search of possible sound archetypes to add to the list of those already known and present in other forms of expression.



INAF – ISTITUTO DI ASTROFISICA SPAZIALE E FISICA COSMICA DI PALERMO,  
VIA UGO LA MALFA 153, 90146 PALERMO. TEL. 091-233247/261 –  
FAX 091-233444. E-MAIL: [INFO-RICERCA@IFC.INAF.IT](mailto:INFO-RICERCA@IFC.INAF.IT)



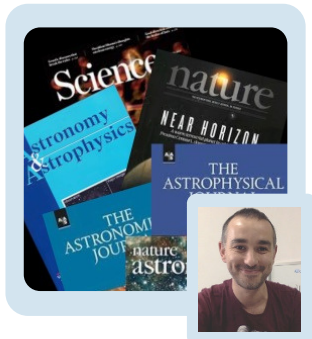
# B.O.M – BULLETIN OF THE MONTH

## OCTOBER 2022



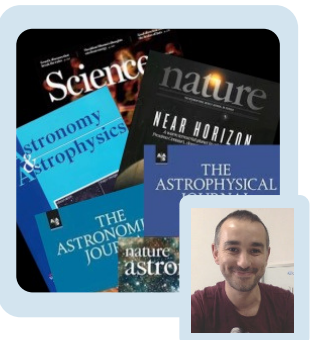
INAF - IASF PALERMO

### PUBLICATIONS



- **Title:** "A blast from the infant Universe: The very high-z GRB 210905A".  
**Authors:** A. Rossi,..., **A. D'Ai** et al. **Journal:** Astronomy & Astrophysics.  
**Link:** <https://arxiv.org/pdf/2202.04544.pdf>.

"In this work the authors present a detailed follow-up of the very energetic gamma-ray burst (GRB) 210905A at a high redshift of  $z = 6.312$  and its luminous X-ray and optical afterglow. Following the detection by Swift and Konus-Wind, photometric and spectroscopic follow-up in the optical and near-infrared (NIR) were obtained, covering both the prompt and afterglow emission from a few minutes up to 20 Ms after burst. Its afterglow is among the most luminous ever observed, and, in particular, it is one of the most luminous in the optical at  $t > 0.5$  d in the rest frame. The afterglow starts with a shallow evolution that can be explained by energy injection, and it is followed by a steeper decay, while the spectral energy distribution is in agreement with slow cooling in a constant-density environment within the standard fireball theory. The host galaxy is only the fourth GRB host at  $z > 6$  known to date. The collimation corrected gamma-ray energy release is also among the highest ever measured".



- **Title:** "Galactic observatory science with the ASTRI Mini-Array at the Observatorio del Teide". **Authors:** A. D'Ai,..., A. Compagnino,..., A. Tutone, ..., G. Cusumano,..., M. Del Santo, A. La Barbera, V. La Parola, F. Pintore,..., A. Pagliaro et al.  
**Journal:** Journal of High Energy Astrophysics.  
**Link:** <https://arxiv.org/pdf/2208.03181.pdf>

"The ASTRI (Astrofisica con Specchi a Tecnologia Replicante Italiana) Mini-Array will be composed of nine imaging atmospheric Cherenkov telescopes at the Observatorio del Teide site. The array will be best suited for astrophysical observations in the 0.3–200 TeV range with an angular resolution of a few arc-minutes and an energy resolution of 10-15%. A core-science programme in the first four years will be devoted to a limited number of key targets, addressing the most important open scientific questions in the very-high energy domain. At the same time, thanks to a wide field of view of about 10 degrees, ASTRI Mini-Array will observe many additional field sources, which will constitute the basis for the long-term observatory programme that will eventually cover all the accessible sky. In this paper, we review different astrophysical Galactic environments, e.g. pulsar wind nebulae, supernova remnants, and gamma-ray binaries, and show the results from a set of ASTRI Mini-Array simulations of some of these field sources made to highlight the expected performance of the array (even at large offset angles) and the important additional observatory science that will complement the core-science program".



INAF – ISTITUTO DI ASTROFISICA SPAZIALE E FISICA COSMICA DI PALERMO,  
VIA UGO LA MALFA 153. 90146 PALERMO. TEL. 091-233247/261 –  
FAX 091-233444. E-MAIL: [INFO-RICERCA@IFC.INAF.IT](mailto:INFO-RICERCA@IFC.INAF.IT)



# B.O.M – BULLETIN OF THE MONTH

## OCTOBER 2022



INAF - IASF PALERMO

### PUBLICATIONS



- **Title:** "The ASTRI Mini-Array of Cherenkov telescopes at the Observatorio del Teide".  
**Authors:** S. Scuderi, ..., O. Catalano, ..., B. Biondo, ..., R. Canestrari, M. Capalbi, ..., G. Contino, M. Corpora, ..., G. Cusumano, A. D'Ai, ..., C. Gargano, ..., S. Giarrusso, ..., D. Impiombato, ..., A. La Barbera, V. La Parola, ..., F. Lo Gerfo, ..., M.C. Maccarone, ..., T. Mineo, D. Mollica, ..., A. Pagliaro, ..., F. Pintore, ..., P. Sangiorgi, G. Sottile et al.  
**Journal:** Journal of High Energy Astrophysics.  
**Link:** <https://arxiv.org/pdf/2208.04571>.

"The ASTRI Mini-Array (MA) is an INAF project to build and operate a facility to study astronomical sources emitting at very high-energy in the TeV spectral band. The ASTRI MA consists of a group of nine innovative Imaging Atmospheric Cherenkov telescopes. The telescopes will be installed at the Teide Astronomical Observatory of the Instituto de Astrofisica de Canarias (IAC) in Tenerife (Canary Islands, Spain) on the basis of a host agreement with INAF. Thanks to its expected overall performance, better than those of current Cherenkov telescopes' arrays for energies above  $\sim 5$  TeV and up to 100 TeV and beyond, the ASTRI-MA will represent an important instrument to perform deep observations of the galactic and extragalactic sky at these energies" .



- **Title:** "ASTRI Mini-Array core science at the Observatorio del Teide".  
**Authors:** S. Vercellone, ..., O. Catalano, ..., F. Pintore, ..., A. Compagnino, ..., A. D'Ai, ..., A. Tutone, ..., G. Cusumano, M. Del Santo, ..., A. La Barbera, ..., V. La Parola, ..., M.C. Maccarone, ..., A. Pagliaro, ..., P. Sangiorgi et al.  
**Journal:** Journal of High Energy Astrophysics.  
**Link:** <https://arxiv.org/pdf/2208.03177>.

"The ASTRI Project led by the Italian National Institute for Astrophysics (INAF) is developing and will deploy at the Observatorio del Teide a mini-array (ASTRI Mini-Array) composed of nine telescopes similar to the small-size dual-mirror Schwarzschild-Couder telescope (ASTRI-Horn) currently operating on the slopes of Mt. Etna in Sicily. The ASTRI Mini-Array will surpass the current Cherenkov telescope array differential sensitivity above a few tera-electronvolt (TeV), extending the energy band well above hundreds of TeV. This will allow us to explore a new window of the electromagnetic spectrum, by convolving the sensitivity performance with excellent angular and energy resolution figures. In this paper we describe the Core Science that we will address during the first four years of operation, providing examples of the breakthrough results that we will obtain when dealing with current open questions, such as the acceleration of cosmic rays, cosmology and fundamental physics and the new window, for the TeV energy band, of the time-domain astrophysics" .



INAF – ISTITUTO DI ASTROFISICA SPAZIALE E FISICA COSMICA DI PALERMO,  
VIA UGO LA MALFA 153. 90146 PALERMO. TEL. 091-233247/261 –  
FAX 091-233444. E-MAIL: [INFO-RICERCA@IFC.INAF.IT](mailto:INFO-RICERCA@IFC.INAF.IT)



# B.O.M – BULLETIN OF THE MONTH

## OCTOBER 2022



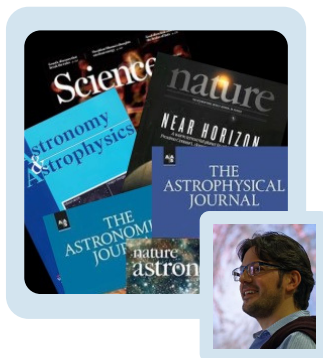
INAF - IASF PALERMO

### PUBLICATIONS



- **Title:** "Extragalactic observatory science with the ASTRI mini-array at the Observatorio del Teide". **Authors:** F. G. Saturni,..., **M. Capalbi**,..., **A. Pagliaro**,..., **G. Cusumano**,..., **A. La Barbera** et al. **Journal:** Journal of High Energy Astrophysics.  
**Link:** <https://arxiv.org/pdf/2208.03176>.

"The ASTRI Mini-Array is a next-generation system of nine imaging atmospheric Cherenkov telescopes that is going to be built at the Observatorio del Teide site. After a first phase, in which the instrument will be operated as an experiment prioritizing a schedule of primary science cases, an observatory phase is foreseen in which other significant targets will be pointed. We focus on the observational feasibility of extragalactic sources and on astrophysical processes that best complement and expand the ASTRI Mini-Array core science, presenting the most relevant examples that are at reach of detection over long-term time scales and whose observation can provide breakthrough achievements in the very-high energy extragalactic science. Such examples cover a wide range of  $\gamma$ -ray emitters, including the study of AGN low states in the multi-TeV energy range, the possible detection of Seyfert galaxies with long exposures and the searches of dark matter lines above 10 TeV. Simulations of the presented objects show that the instrument performance will be competitive at multi-TeV energies with respect to current arrays of Cherenkov telescopes".



- **Title:** "Detection of an unidentified soft X-ray emission feature in NGC 5548". **Authors:** L. Gu, ..., **C. Pinto**, et al. **Journal:** Astronomy & Astrophysics.  
**Link:** <https://arxiv.org/abs/2207.09114>.

"NGC 5548 is an active Seyfert 1 galaxy in which a supermassive black hole emits radiation across the electromagnetic spectrum by accretion of matter. It exhibits a variety of spectroscopic features in the soft X-ray band including absorption by matter outflows or winds with a wide range of ionisation states and velocities up to several thousand kilometres per second. A high-resolution X-ray spectroscopic study with XMM-Newton and Chandra revealed an unidentified emission line at 18.1 Angstroms. No known instrumental problems nor atomic transitions can explain this excess. The observed line intensity appears to correlate with the spectral state of the source which could indicate obscuration of the source by a highly ionised and fast wind. An intriguing possibility is the line emission from the charge exchange between a partially ionised wind and a neutral layer in the near environment".



INAF – ISTITUTO DI ASTROFISICA SPAZIALE E FISICA COSMICA DI PALERMO,  
VIA UGO LA MALFA 153. 90146 PALERMO. TEL. 091-233247/261 –  
FAX 091-233444. E-MAIL: [INFO-RICERCA@IFC.INAF.IT](mailto:INFO-RICERCA@IFC.INAF.IT)





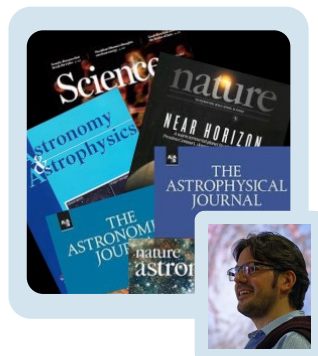
# B.O.M – BULLETIN OF THE MONTH

## OCTOBER 2022



INAF - IASF PALERMO

### PUBLICATIONS



- **Title:** "The Long Stare at Hercules X-1. I. Emission Lines from the Outer Disk, the Magnetosphere Boundary, and the Accretion Curtain". **Authors:** P. Kosec, ..., **C. Pinto**, et al. **Journal:** The Astrophysical Journal.  
**Link:** <https://arxiv.org/abs/2208.08930>.

"Hercules X-1 is an X-ray pulsar seen almost edge-on with a warped accretion disc. The precession of the disc allows for unique and variable lines of sight towards the X-ray source. To study the structure of the disc we obtained an extensive observational campaign with XMM-Newton and Chandra during one precession cycle, resulting in one of the best datasets ever taken on an accreting neutron star. The combination of data from high-resolution gratings and broadband CCDs revealed a complex Fe K line structure, with three emission components of different velocities. We also revealed a forest of lines in the soft band below 2 keV that clearly evolve with the observed precession phase and luminosity. This allowed us to identify three different emission regions in the disc and obtain an unprecedented 360-degree view".



- **Title:** "A transient ultraluminous X-ray source in NGC 55".  
**Authors:** **A. Robba**, **C. Pinto**, **F. Pintore**, **Rodriguez, G.**, **Ambrosi, E.**, **Barra F.**, **Cusumano, G.**, **D'Ai, A.**, **Del Santo, M.**,..., **Marino, A.** et al.  
**Journal:** Monthly Notices of the Royal Astronomical Society.  
**Link:** <https://arxiv.org/pdf/2207.09447>.

"In this paper, we report the identification of a new ultraluminous X-ray source in the galaxy NGC 55, thanks to recent observations by XMM-Newton and the Neil Gehrels Swift Observatory. The celestial object was previously classified as a transient X-ray source with a luminosity around  $10^{38}$  erg/s. Thanks to new and deeper observations, we show that the source reaches a peak brightness greater than  $10^{39}$  erg/s".

### OTHER NEWS FROM IASF PALERMO



- The usual scientific meetings of the Institute (**journal club and seminars**) will take place on **Tuesdays at 2.30 pm**.
- For more information:
  - visit our **website**;
  - follow us on **Facebook** and **YouTube**;
  - or write at [info-ricerca@ifc.inaf.it](mailto:info-ricerca@ifc.inaf.it).



INAF – ISTITUTO DI ASTROFISICA SPAZIALE E FISICA COSMICA DI PALERMO,  
VIA UGO LA MALFA 153. 90146 PALERMO. TEL. 091-233247/261 –  
FAX 091-233444. E-MAIL: [INFO-RICERCA@IFC.INAF.IT](mailto:INFO-RICERCA@IFC.INAF.IT)

