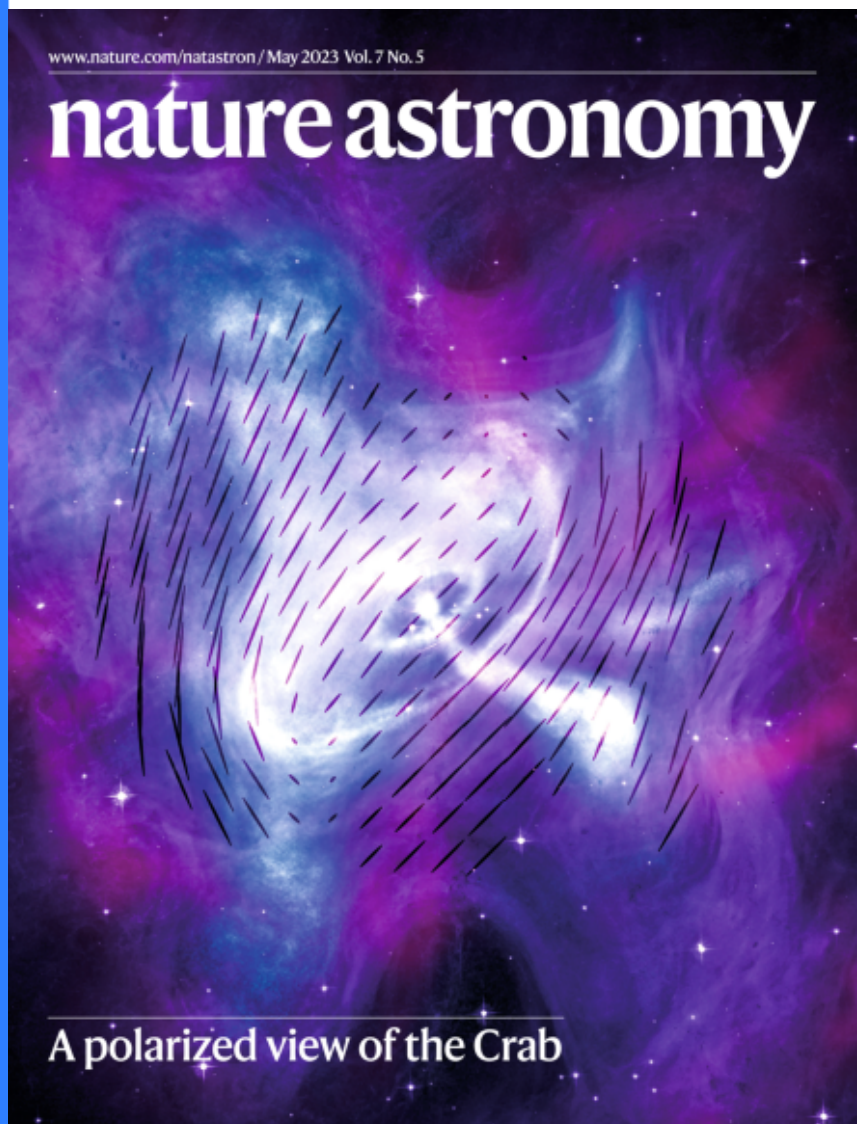


MONTHLY NEWSLETTER

INAF Osservatorio Astrofisico di Arcetri

HIGHLIGHT



[Bucciantini et al. \(2023\)](#).
Image: N. Bucciantini, IXPE
Collaboration.

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PRIN 2023 GRANTS AWARDED

Unveiling the footprints of the cosmic ray journey through the Galaxy and beyond

The propagation of cosmic rays in the acceleration region, in the vicinity of sources, through the Galaxy and even when escaping the host galaxies, is affected by the energetic particles themselves, through the excitation of instabilities that amplify the turbulence level in the ambient medium.

The proposed research is aimed at clarifying the complex interplay between cosmic rays and cosmic plasma and translate this knowledge into predictions for observational signatures to be looked for by existing and upcoming gamma-ray and neutrino observatories.

E. Amato (PI), R. Bandiera, N. Bucciantini, G. Morlino, B. Olmi, L. Del Zanna

Experimental and computational analog studies to support identification of organics on Mars by the NASA Mars 2020 Perseverance rover

This proposal supports the detection of high biosignature preservation potential minerals and organic matter by the NASA Mars 2020 Perseverance rover, assisting the interpretation of data collected by the SuperCam and SHERLOC instruments.

In particular, custom databases of spectroscopic features for martian analog samples will be assembled through both experimental and computational studies, to be used for searching mineral deposits with high biosignature preservation potential and possible evidence of past life, specifically focusing on detection of molecular biosignatures, which is key to select the most promising samples to be cached for future return to Earth.

T. Fornaro (PI), A. Turchi, S. Donati, F. Tribioli

COSMIC-POT: new challenges in the nucleosynthesis of the heavy elements- Observations, Models and innovative Instrumentation

Neutron-capture elements are key players in a large number of astrophysical topics. Cosmic-pot proposes to address open questions on neutron-capture elements with a multidisciplinary approach: by exploiting large spectroscopic surveys, by advanced modelling chemical evolution of the Galaxy, and by providing a concept study of a newly-designed, multi-object, high-resolution and high-efficiency spectrometer HRMOS for the ESO Very Large Telescope.

L. Magrini (PI), S. Randich, G. Sacco, E. Franciosini, E. Oliva, A. Tozzi e A. Brucalassi, A. Zanazzi.

PROMETEUS: PRObing the METallicity Evolution of the Universe with Spectroscopy

All chemical elements heavier than Helium are continuously created by stars. PROMETEUS aims to obtain, for the first time, a complete picture of the evolution of these chemical elements across cosmic times for all the main components of galaxies, namely stars, the interstellar medium (ISM) in its multiphase structure, including those parts directly affected by AGNs. This program is based on a large set of incoming observations on a number of top-level telescopes, in particular JWST, VLT/MOONS, VLT/MUSE, 4MOST, and WHT/WEAVE.

F. Mannucci (PI), G. Cresci, F. Belfiore, A. Gallazzi, S. Zibetti, A. Marconi, G. Tozzi

Chemical Origins: linking the fossil composition of the Solar System with the chemistry of protoplanetary disks

The goal of this project is to unveil our Chemical Origins through a multidisciplinary approach, which involves researchers from two INAF institutes and the University of Perugia. INAF-OAA will study the chemistry of analogues of the protosolar nebula, i.e. disks around young Sun-like stars of 10000 to a few million years, and will compare it with the fossil composition of the SS imprinted in the Outer Solar System Objects. To perform this comparison, the chemists from will investigate the formation routes of complex organics, deuterated molecules, and salts. These species are key to test whether (and how much) the chemistry of the SS is inherited from the early phases of its formation, or it is subject to a chemical reset occurring in the disk and/or during the formation of planets.

L. Podio (PI), C. Codella.

JWST: APPROVED GENERAL OBS. PROGRAMS IN CYCLE 2

Luminous and dark matter in massive galaxies at $z=4-5$

PI: **F. Lelli**
Co-PIs: **F. Belfiore,**
G. Cresci

The program requested JWST imaging for a golden sample of 16 massive galaxies at $z=4-5$ with existing ALMA [CII] data of the highest quality. The [CII] data reveals regularly rotating disks, allowing for the derivation of rotation curves that trace the total mass distribution. To infer the properties of dark matter (DM) halos, however, we miss a key piece of information: the stellar mass distribution.

Allocation: 25.0 hours

A JWST high-definition view of an extremely metal-poor interstellar medium

PI: A. Aloisi
Co-PI: L. Hunt

The program proposed MIRI/MRS spectroscopy of the most extreme BCD, I Zw 18, at a distance of 18.2 Mpc. Its extremely low metal abundance (2-3% solar), and its high specific star-formation rate (sSFR = 10^{-7} - 10^{-8} /yr) powered by two massive star clusters, make it the best approximation we have for star formation in the nearly pristine interstellar medium (ISM) at early epochs. These observations are designed to map at 25-50 pc resolution the constituents of the ISM in this well-studied iconic target.

Allocation: 24.4 hours

<https://www.stsci.edu/jwst/science-execution/approved-programs/general-observers/cycle-2-go>

MEDIA INAF: [Jwst, selezionati i programmi per il secondo ciclo](#)

REFEREED PUBLICATIONS

G. Risaliti, E. Lusso, E. Nardini, G. Bargiacchi, S. Bisogni, A. Sacchi, M. Signorini, B. Trefoloni
Quasars as high-redshift standard candles

Astronomische Nachrichten, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230413752R/abstract>

F. Calura, Marco Palla, L. Morselli, E. Spitoni, V. Casasola, K. Verma, A. Enia, M. Meneghetti, **S. Bianchi**, F. Pozzi, C. Gruppioni

A Bayesian chemical evolution model of the DustPedia galaxy M74

Monthly Notices of the Royal Astronomical Society, Volume 523, Issue 2, pp.2351-2368

<https://ui.adsabs.harvard.edu/abs/2023MNRAS.tmp.1344C/abstract>

G. Cosentino, J. C. Tan, I. Jiménez-Serra, **F. Fontani**, P. Caselli, J. D. Henshaw, A. T. Barnes, C.-Y. Law, S. Viti, R. Fedriani, C.-J. Hsu, P. Gorai, S. Zeng

Deuterium Fractionation across the Infrared Dark Cloud G034.77-00.55

interacting with the Supernova Remnant W44

Astronomy & Astrophysics, in press

<https://www.aanda.org/component/article?access=doi&doi=10.1051/0004-6361/202346676>

A. T. Barnes, J. Liu, Q. Zhang, J. C. Tan, F. Bigiel, P. Caselli, G. Cosentino, **F. Fontani**, J. D. Henshaw, I. Jiménez-Serra, D-S. Kalb, C. Y. Law, S. N. Longmore, R. J. Parker, J. E. Pineda, A. Sánchez-Monge, W. Lim, K. Wang

Mother of Dragons: A Massive, quiescent core in the dragon cloud (IRDC G028.37+00.07)

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2303.15499>

D. R.G. Schleicher, J. Pablo Hidalgo, **D. Galli**

Survival of fossil fields during the pre-main sequence evolution of intermediate-mass stars

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2306.17131>

P. Li, Y. Tian, J. P. Mariana, M. S. Pawlowski, **F. Lelli**, .S.S. McGaugh, J.M. Schombert, J. I. Read, P.-C. Yu, C.-M. Ko

Measuring galaxy cluster mass profiles into low acceleration regions with galaxy kinematics

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230310175L/abstract>

B. Trefoloni, **E. Lusso**, **E. Nardini**, **G. Risaliti**, G. Bargiacchi, S. Bisogni, F. Civano, M. Elvis, G. Fabbiano, R. Gilli, **A. Marconi**, G. Richards, A. Sacchi, **F. Salvestrini**, **M. Signorini**, C. Vignali

The most luminous blue quasars at $3.0 < z < 3.3$ - III. LBT spectra and accretion parameters

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230507699T/abstract>

A. Hourihane, [...], **L. Magrini**, [...], **S. Randich**, **G. G. Sacco**, [...], **E. Franciosini**, [...], **L. Morbidelli**, **L. Spina** et al.

The Gaia-ESO Survey: homogenisation of stellar parameters and elemental abundances

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230407720H/abstract>

M. Lefkir, E. Kammoun, D. Barret, P. Boorman, G. Matzeu, J.M. Miller, **E. Nardini**, A. Zoghbi

A hard look at the X-ray spectral variability of NGC 7582

Monthly Notices of the Royal Astronomical Society (2023), 522, Issue

<https://ui.adsabs.harvard.edu/abs/2023MNRAS.522.1169L/abstract>

E. Kammoun, Z. Igo, J.M. Miller, A.C. Fabian, M.T. Reynolds, A. Merloni, D. Barret, **E. Nardini**, P.O. Petrucci, E. Piconcelli, S. Barnier, J. Buchner, T. Dwelly, I. Grotova, M. Krumpe, T. Liu, K. Nandra, A. Rau, M. Salvato, T. Urrutia, J. Wolf

The first X-ray look at SMSS J114447.77-430859.3: the most luminous quasar in the last 9 Gyr

Monthly Notices of the Royal Astronomical Society, in press

<https://ui.adsabs.harvard.edu/abs/2023MNRAS.tmp..971K/abstract>

A. Luminari, A. Marinucci, S. Bianchi, B. de Marco, C. Feruglio, G. Matt, R. Middei, **E. Nardini**, E. Piconcelli, S. Puccetti, F. Tombesi

The lively accretion disc in NGC 2992. III. Tentative evidence of rapid Ultra Fast Outflow variability

Astrophysical Journal, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230503754L/abstract>

R. D. Jeffries, [...], **S. Randich**, [...], **L. Morbidelli**, L. Prisinzano, **G. G. Sacco** et al.

The Gaia-ESO Survey: empirical estimates of stellar ages from lithium equivalent widths (EAGLES)

Monthly Notices of the Royal Astronomical Society (2023), 523, 1

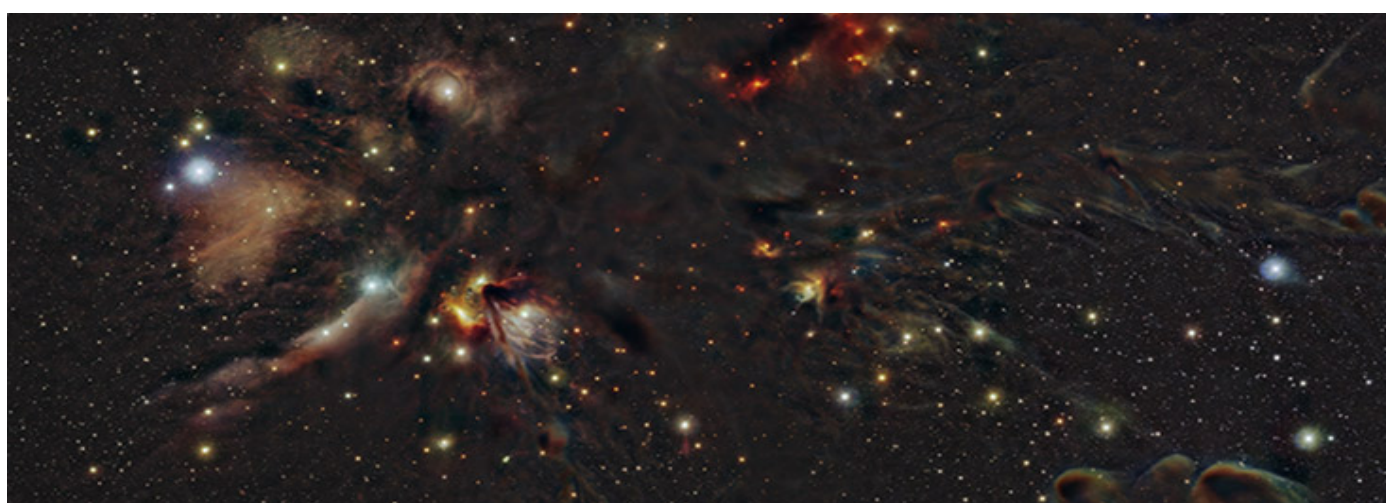
<https://ui.adsabs.harvard.edu/abs/2023MNRAS.523..802J/abstract>

S. Meingast, [...], **G. Sacco** et al.

VISIONS: The VISTA Star Formation Atlas – I. Survey overview

Astronomy & Astrophysics (2023), 673, A58

https://www.aanda.org/articles/aa/full_html/2023/05/aa45771-22/aa45771-22.html



ESO: [ESO telescope reveals hidden views of vast stellar nurseries](#)

Media INAF: [Vasti vivai stellari nell'atlante di Visions](#)

G. Pagnini, **S. Salvadori**, M. Rossi, D. Aguado, I. Koutsouridou, Á. Skúladóttir

On the dearth of C-enhanced metal-poor stars in the galactic bulge

Monthly Notices of the Royal Astronomical Society, in press

<https://ui.adsabs.harvard.edu/abs/2023MNRAS.521.5699P/abstract>

A. Saccardi, **S. Salvadori** et al.

Evidence of First Stars-enriched Gas in High-redshift Absorbers

The Astrophysical Journal (2023), 948, 1

<https://iopscience.iop.org/article/10.3847/1538-4357/acc39f>



ESO: [Astronomers find distant gas clouds with leftovers of the first stars](#)

MEDIA INAF: [In remote nubi di gas, le tracce delle prime stelle](#)

UNIFI: [In nuvole di gas nell'Universo lontano le tracce chimiche delle prime stelle](#)

Á. Skúladóttir, I. Vanni, **S. Salvadori**, R. Lucchesi

Tracing Pop III supernovae with extreme energies through the Sculptor dwarf spheroidal galaxy

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2023arXiv230502829S/abstract>

OTHER PUBLICATIONS

S. Bianchi

Un tabernacolo per puntare a sud

Giornale di Astronomia, Volume 49/2, 2023, giugno

<http://www.libraweb.net/riviste.php?chiave=88&h=437&w=300>

G. Sacco, [...], L. Magrini, [...], S. Randich, V. Roccatagliata, L. Spina

The 4MOST Survey of Young Stars (4SYS)

The Messenger, vol. 190, p. 7-9

<https://www.eso.org/sci/publications/messenger/archive/no.190-mar23/messenger-no190-7-9.pdf>

NEW ARRIVALS

RESEARCHER

Lorenzo Spina



I am a stellar spectroscopist and a machine learning enthusiast with 10 years of experience in top research institutes around the globe: INAF Arcetri and Padua (Italy), Monash University (Australia), Space Science Telescope Institute (US), University of Sao Paulo (Brazil). I study our own Galaxy: how it is structured, how it formed, and how it evolves with time. For my research I analyse huge volumes of data gathered by the largest-scale stellar surveys ever undertaken, such as Gaia, APOGEE, Gaia-ESO, and GALAH. My task is to exploit this enormous body of data to its maximum potential. I am also deeply involved in large collaborations for

next-generation surveys and instruments (e.g., 4MOST, HRMOS, WST) which will collect much more data during the next decades. On top of that, I also study chemical signatures of planet engulfment events in Sun-like stars. I am interested in knowing the rate of suns swallowing their own planets. This line of research sheds light on the possible evolutionary paths of planetary systems and on the probability of finding analogues of our quiet Solar System. Last but not the least, I am always excited about sharing my love for astronomy, and for the open spirit of scientific inquiry. I practice this most visibly through teaching and mentorship. I also actively promote and support outreach activities for students and the general public.

POSTDOCTORAL FELLOW

Anna Feltre - As a researcher working in the field of extragalactic astrophysics, I am passionate about understanding the properties of galaxies and Active Galactic Nuclei (AGN), their evolution over cosmic time and the interaction between the AGN and its host galaxy. In particular, my research is devoted to study the multi-band (optical to sub-mm) emission of galaxies through the development of spectral models and analysis tools tailored to the interpretation of spectro-photometric data. I approached this line of research during my PhD between the University of Padova and ESO, and then extended my skills in spectral synthesis techniques at the Institut d'Astrophysique de Paris. I worked at the Centre de Recherche Astrophysique de Lyon, SISSA and INAF-OAS where I matured a strong expertise in



interpreting the signatures from different ionizing sources in the rest-frame optical and UV spectra of distant galaxies and their local analogues. I am looking forward to combining my expertise in spectral modelling with the long-standing experience in observational spectroscopy at INAF-OAA!

TECHNICAL OPERATOR



Giuseppe Settembre - I'm a Technical Operator of the "Didactics and Dissemination" working group and my job is to collaborate and support the team in email management, statistics, Siae documentation, graphics, etc... I have a degree in Theology at Assemblies of God in Italy's Italian Bible Institute from the Academy of Rome and I look forward to graduating in Aerospace Engineering from the University of Palermo.

For a period I was enrolled in the disabled astronauts project (called Parastronauts) as deaf, at the ESA project.

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