

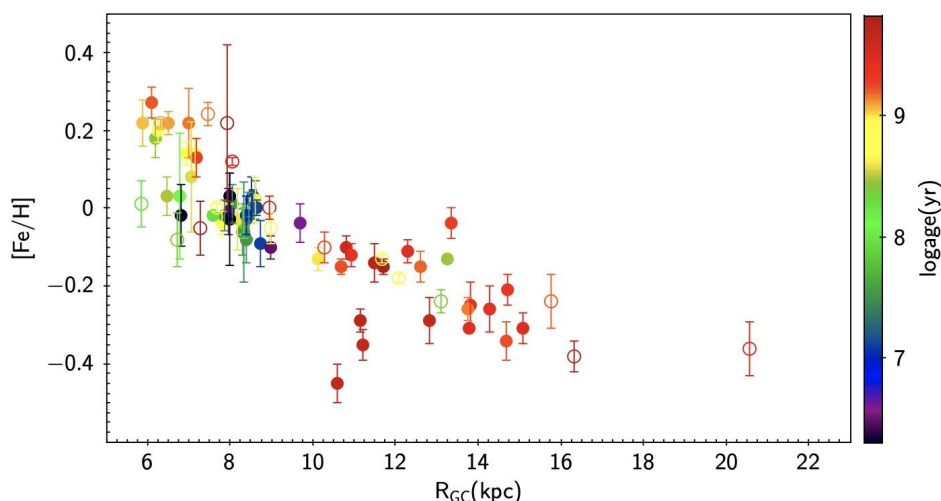
## HIGHLIGHTS

### The final catalogue of the Gaia-ESO Survey is public

On May 16th, ESO has released the final [catalogue](#) of the Gaia-ESO Survey (GES), a large public spectroscopic survey carried out with the Very Large Telescope (VLT) of the European Southern Observatory (ESO) in Chile.

The catalogue contains the astrophysical parameters derived from the analysis of about 190,000 spectra resulting from the observations of 115,000 stars sampling all the components of our Galaxy, the thin and thick discs, the bulge, the halo, and open star clusters covering the entire age range from a few million to many billions years.

The observations were performed with the multi-object instrument FLAMES at the focus of VLT UT2, using Giraffe and UVES spectrographs, during 340 nights distributed between December 2011 and January 2018. The catalogue is the result of the work of a large consortium in which more than 500 researchers from institutes distributed in various parts of the world, but mostly European, participated.



[Fe/H] vs Galactocentric distance distribution of the Gaia-ESO (filled circles) and archive (open circles) open clusters. The symbols are colour-coded by age. Credits: Gaia-ESO/ Randich et al. 2022

**Team INAF-OAA: S. Randich** (Survey Co-PI), **E. Franciosini**, **L. Magrini**, **L. Morbidelli**, **E. Pancino**, **G. Sacco**, **N. Sanna**, **M. Tsantaki**, **M. Van der Swaelmen**

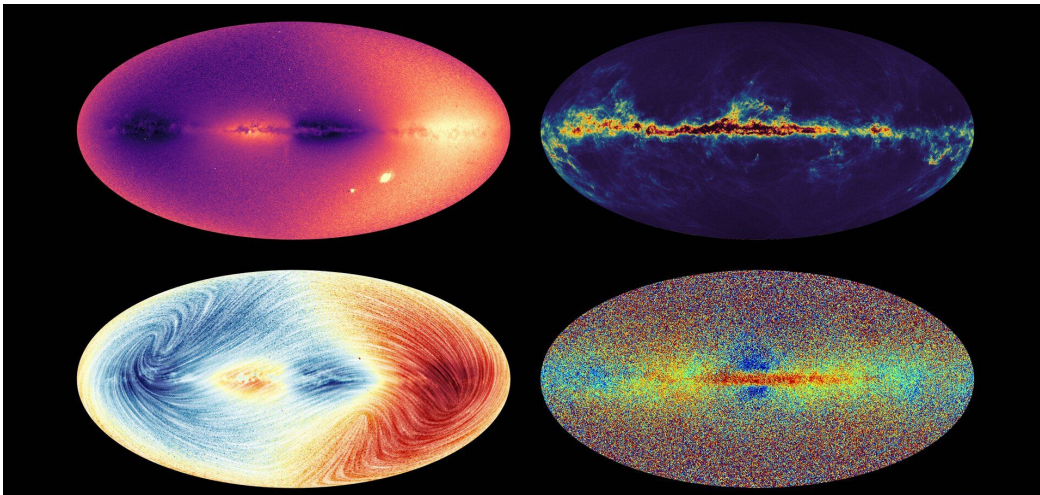
News ESO: <https://www.eso.org/sci/publications/announcements/sciann17497.html>

News INAF: <http://www.inaf.it/it/notizie-inaf/gaia-eso-catalogo-finale>

## Gaia data release 3

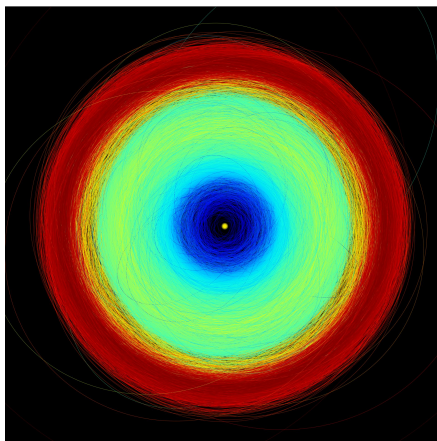
On June 13rd, [ESA mission Gaia](#)'s third full data set was released, which contains new and improved details for almost two billion objects in our Milky Way and revolutionises our understanding of the galaxy. These data were collected between 25 July 2014 and 28 May 2017.

New in this data set are spectra for a significant number of objects, which can be used to determine accurate luminosities, temperatures, masses, and chemical compositions. This release also includes radial velocities for 33 million stars, a five time increase as compared to data release 2. Also new in this data set is the largest catalogue yet of binary stars in the Milky Way, which is crucial to understand stellar evolution.



Four sky maps made with the new ESA Gaia DR3. 1. Radial velocity; 2. Radial velocity and proper motion; 3. Interstellar dust; 4. Chemical map. The colour indicates the stellar metallicity. Credits: ESA/Gaia/DPAC

Additionally, DR3 includes information about stars that change brightness over time, Solar System objects such as asteroids and planetary moons, and galaxies and quasars outside the Milky Way. With DR3 high precision orbital solutions for about 154,000 asteroids (as well as their individual epoch observations) and reflectance spectra for more than 60,000 objects have been obtained.



The orbits of the more than 150 000 asteroids in Gaia's DR3. Credits: ESA/Gaia/DPAC

### Team INAF-OAA:

**S. Randich** (Gaia Science Team), **E. Pancino**, **N. Sanna**, **M. Tsantaki**, (DPAC - Data Processing and Analysis Consortium)

**A. Dell'Oro** is responsible for the very first step of the processing chain producing the final asteroid data in the catalogue: the astrometric analysis at single CCD level.

---

---

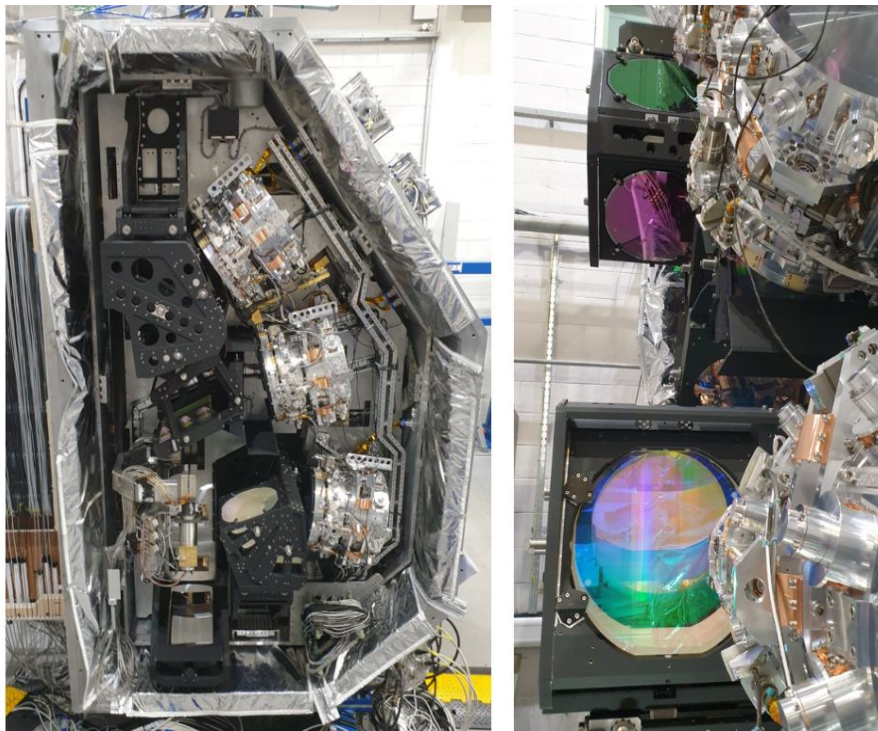
# TECHNOLOGICAL MILESTONES

## MOONS: assembly completed

Another step forward for MOONS, the multi-object optical and infrared spectrograph under construction for ESO's Very Large Telescope in Chile: the assembly of the various components at the Royal Observatory of Edinburgh was successful.

First the mechanics for the two large collimators of the spectrograph were created, then those for the dichroics and finally the cryogenic handling systems capable of moving over 400 kg of optical and mechanical components that make up the H and RI branches, allowing you to switch from high resolution mode to low resolution mode in a few seconds. Everything was made, assembled and tested in Italy, then shipped at the Royal Observatory in Edinburgh where the optics were assembled, under our supervision.

**A. Tozzi** is system engineer of the optomechanical components of MOONS in charge of INAF-Arcetri Astrophysical Observatory.



Credits: David Lee/ Royal Observatory of Edinburgh

---

---

## REFEREED PUBLICATIONS

**S. Bianchi**, V. Casasola, **E. Corbelli**, F. Galliano, **L. Magrini**, A. Nersesian, **F. Salvestrini**, M. Baes, L.P. Cassara, C.J.R. Clark, I. De Looze, A.P. Jones, S.C. Madden, A. Mosenkov, N. Ysard

*Dust emissivity in resolved spiral galaxies*

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2206.13375>

**F. Fontani**, A. Schmiedeke, A. Sanchez-Monge, L. Colzi, D. Elia, V.M. Rivilla, **M.T. Beltran**, L. Bizzocchi, P. Caselli, **L. Magrini**, D. Romano

*CHEMOUT: CHEMical complexity in star-forming regions of the OUTER Galaxy. II. Methanol formation at low metallicity*

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2022arXiv220509136F/abstract>

**F. Mannucci**, **E. Pancino**, **F. Belfiore**, C. Cicone, A. Ciurlo, **G. Cresci**, **E. Lusso**, A. Marasco, **A. Marconi**, **E. Nardini**, **E. Pinna**, P. Severgnini, P. Saracco, **G. Tozzi**, S. Yeh

*Unveiling the population of dual- and lensed- AGNs at sub-arcsec separations with Gaia*

Nature Astronomy, in press

<http://arxiv.org/abs/2203.11234>

**F. Massi**, R. López, **M.T. Beltrán**, R. Estalella, J. M. Girart

*NIR spectroscopic survey of protostellar jets in the star forming region IC 1396N*

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2206.03057>

**E. Pancino**, P.M. Marrese, S. Marinoni, **N. Sanna**, **A. Turchi**, **M. Tsantaki**, M. Rainer, G. Altavilla, M. Monelli, L. Monaco

*The Gaia EDR3 view of Johnson-Kron-Cousins standard stars: the curated Landolt and Stetson collections*

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2022arXiv220506186P/abstract>

**S. Randich**, G. Gilmore, **L. Magrini**, **G. G. Sacco**, R. J. Jackson, R. D. Jeffries, C. C. Worley, A. Hourihane, A. Gonneau, C. Viscasillas Vázquez, **E. Franciosini**, J. R. Lewis, E. J. Alfaro, C. Allende Prieto, T. Bensby, R. Blomme, A. Bragaglia, E. Flaccomio, P. François, M. J. Irwin, S. E. Koposov, A. J. Korn, A. C. Lanzafame, **E. Pancino**, ....., **L. Morbidelli**, ... **N. Sanna** et al.

*The Gaia-ESO Public Spectroscopic Survey: Implementation, data products, open cluster survey, science, and legacy*

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2206.02901>

---

---

E. de Ona Wilhelmi, R. Lopez-Coto, **E. Amato**, F. Aharonian

***On the Potential of Bright, Young Pulsars to Power Ultrahigh Gamma-Ray Sources***

ApJ Letters (2022), 930, L2

<https://ui.adsabs.harvard.edu/abs/2022ApJ...930L...2D/abstract>

A. Rossi, B. Rothberg, E. Palazzi, D.A. Kann, P. D'Avanzo, L. Amati, S. Klose, A. Perego, E. Pian, C. Guidorzi, A. S. Pozanenko, S. Savaglio, G. Stratta, **G. Agapito**, S. Covino, F. Cusano, V. D'Elia, M. De Pasquale, M. Della Valle, O. Kuhn, L. Izzo, E. Loffredo, N. Masetti, A. Melandri, P.Y. Minaev, A. Nicuesa Guelbenzu, D. Paris, S. Paiano, **C. Plantet**, **F. Rossi** et al.

***The Peculiar Short-duration GRB 200826A and Its Supernova***

The Astrophysical Journal (2022), 932, 1

<https://iopscience.iop.org/article/10.3847/1538-4357/ac60a2>

Media INAF: <https://www.media.inaf.it/2022/06/08/mezzo-secondo-la-vita-breve-duno-strano-grb/>

R. López, R. Estalella, **M.T. Beltrán**, **F. Massi**, J.A. Acosta-Pulido, J. M. Girart

***Collision of protostellar jets in the star-forming region IC 1396N. Analysis of knot proper motions***

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2203.13853>

M. G. Jones, D. J. Sand, M. Bellazzini, K. Spekkens, A. Karunakaran, E.A. K. Adams, G. Battaglia, G. Beccari, P. Bennet, J. M. Cannon, **G. Cresci**, D. Crnojevic, N. Caldwell, J. Fuson, P. Guhathakurta, M. P. Haynes, J. L. Inoue, **L. Magrini** et al.

***Young, blue, and isolated stellar systems in the Virgo Cluster. II. A new class of stellar system***

Astrophysical Journal, in press

<https://arxiv.org/abs/2205.0169>

Media INAF: <https://www.media.inaf.it/2022/06/21/sistemi-stellari-blu-isolati/>

L. Barbieri, P. Di Cintio, G. Giachetti, A. Simon-Petit, **L. Casetti**

***Symplectic coarse graining approach to the dynamics of spherical self-gravitating systems***

MNRAS (2022), 512, 2, 3015–3029

<https://academic.oup.com/mnras/article-abstract/512/2/3015/6534926>

P. Tanga, T. Pauwels, F. Mignard, K. Muinonen, A. Cellino, P. David, D. Hestroffer, F. Spoto, J. Berthier, J. Guiraud, W. Roux, B. Carry, M. Delbo, **A. Dell'Oro** et al.

***Data Release 3: the Solar System survey***

Astronomy & Astrophysics, in press

<https://ui.adsabs.harvard.edu/abs/2022arXiv220605561T/abstract>

P. Pinilla, **A. Garufi**, M. Gárate

***Efficient Dust Radial Drift Around Young Intermediate-mass Stars***

Astronomy & Astrophysics, in press

<https://arxiv.org/abs/2206.03057>

C. L. Carilli, C. S. Anderson, **P. Tozzi** et al.

***X-ray Emission and Radio Emission from the Jets and Lobes of the Spiderweb Radio Galaxy***

The Astrophysical Journal (2022), 928, 1

<https://iopscience.iop.org/article/10.3847/1538-4357/ac55a0>

---

---

A. S. Binks, R. D. Jeffries, **G. G. Sacco**, R. J. Jackson, L. Cao, A. Bayo, M. Bergemann, R. Bonito, G. Gilmore, A. Gonneau, F. Jiminéz-Esteban, **L. Morbidelli**, **S. Randich**, V. Roccatagliata, R. Smiljanic, S. Zaggia  
***The Gaia-ESO Survey: Constraining evolutionary models and ages for young low mass stars with measurements of lithium depletion and rotation***  
MNRAS, in press  
<https://arxiv.org/abs/2204.05820>

L. Pasquini, P. Bonifacio, L. Pulone, A. Modigliani, E. Brocato, L. Sbordone, **S. Randich**, G. Cupani  
***Chemical composition of a palomar 12 blue straggler***  
MNRAS (2022), 512, 4, 5701-5705  
<https://ui.adsabs.harvard.edu/abs/2022MNRAS.512.5701P/abstract>

*Gaia* collaboration including **E. Pancino**, **S. Randich**, **A. Dell’Oro**, **N. Sanna**  
***Gaia Data Release 3: A Golden Sample of Astrophysical Parameters***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220605870G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Early Data Release 3: The celestial reference frame (Gaia-CRF3)***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220412574G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Data Release 3: Reflectance spectra of Solar System small bodies***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220612174G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Data Release 3: Pulsations in main sequence OBAF-type stars***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220606075G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Data Release 3: The extragalactic content***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220605681G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Data Release 3: Stellar multiplicity, a teaser for the hidden treasure***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220605595G/abstract>

*Gaia* collaboration including **S. Randich**, **A. Dell’Oro**, **E. Pancino**, **N. Sanna**  
***Gaia Data Release 3: Chemical cartography of the Milky Way***  
Astronomy & Astrophysics, in press  
<https://ui.adsabs.harvard.edu/abs/2022arXiv220605534G/abstract>

---

---

T. Merle, A. S. Hamers, S. Van Eck, A. Jorissen, **M. Van der Swaelmen**, K. Pollard, R. Smiljanic, D. Pourbaix, T. Zwitter, G. Traven, G. Gilmore, **S. Randich**, A. Gonneau, A. Hourihane, **G. Sacco**, C. C. Worley

***HD 74438: A tight spectroscopic quadruple as possible progenitor of sub-Chandrasekhar Type Ia supernovae***

Nature Astronomy, in press

<https://arxiv.org/abs/2205.05045>

## OTHER PUBLICATIONS

R. Spiga

***Il Telescopio Nazionale Galileo: 25 anni dopo. Gli anni 2000 e l'era degli esopianeti.***

Giornale di Astronomia (2022), 48, 2

<http://www.libraweb.net/riviste.php?chiave=88>

## NEW ARRIVALS

### POSTDOCTORAL FELLOWS

**Giannandrea Inchingolo**



I am a creative scientist with a PhD in Plasma Physics and I just started a pst-doc here in Arcetri with Alessandra Zanazzi for game developing and game-based learning activities for astrophysics outreach and education. From 2018, during my PhD at the Instituto Superior Tecnico in Lisbon and the Massachusetts Institute of Technology in Boston, I started developing scientific pieces of art for public engagement, transforming my research and the one of my team in visualisations, sonifications, wall mapping and VR experiences. All these works are combined in the project Into the (un)known that was exhibited with INAF at the 2020 Science festival in Genoa, the 2021 wrong Biennale and 2021 Cinema Venice Biennale. During my post-doc at the University of Bologna, I joined the INAF WG on game-based learning activities and I contributed developing PIXEL, the INAF-GSRC board game on astrophysics observation. I am looking forward to play together these astro games we are developing!