# Dr. Fabrizio Gentile

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## Work Experience

2023 - today
**Postdoctoral researcher**
CEA Paris - Saclay
**Main advisors:** David Elbaz (CEA) & Emanuele Daddi (CEA)

2021 - today
**Associate astronomer**
INAF - Osservatorio di Astrofisica e Scienza dello Spazio (Bologna)

2023 - 2024
**Visiting scholar (Marco Polo Scholarship funded by UniBo)**
The University of Texas at Austin
**Project title:** *Unveiling the dark Universe with JWST*
**Supervisor:** Caitlin Casey (UT Austin)

## Education

2021 - 2025
**Ph.D. in Astrophysics [*cum laude*]**
Alma Mater Studiorum - University of Bologna
**Thesis title:** *Searching for high-redshift progenitors of massive galaxies*
**Supervisors:** Margherita Talia (UniBo) & Andrea Cimatti (UniBo)

2019 – 2021
**M.Sc. in Physics (Astrophysics Curriculum) [110/110 *cum laude*]**
University of Naples "Federico II"
**Thesis title:** *Fast Automated Analysis of strong gravitational lenses in the forthcoming Euclid survey using machine-learning methods*
**Supervisors:** Crescenzo Tortora (INAF) & Giovanni Covone (UniNa)

2016 – 2019
**B.Sc. in Physics [110/110 *cum laude*]**
University of Naples "Federico II"
**Thesis title:** *Searching for strong gravitational lenses with Convolutional Neural Networks*
**Supervisors:** Crescenzo Tortora (INAF) & Giovanni Covone (UniNa)

## Skills

*Languages*
Italian (native) • English (proficient) • French (basic)

*Computer skills*
- **Main developer** of two public codes for astrophysical analyses: LEns MOdelling with Neural networks (LEMON) and Photometry Extractor for Blended Objects (PhoEBO)
- Extensive use of the Windows, Linux/Unix, and MacOS Operative Systems
- Advanced knowledge of Python 3 and its main libraries concerning astronomy (astropy, photutils), deep learning (keras, tensorflow), plotting (matplotlib, seaborn) and data analysis (numpy, scipy, pandas)
- Good knowledge of C, C++ and SQL
- Extensive use of the Microsoft Office suite

## Skills (continued)

- Extensive use of LaTeX and Overleaf

*Technical skills*

- Photometry extraction with SExtractor, Photutils and The Farmer
- Analysis of ALMA and NOEMA interferometric data with CASA (proficient) and GILDAS (basic)
- SED-Fitting with Magphys, Cigale, Eazy, Bagpipes, and Dense Basis
- Implementation of machine learning algorithms with Keras and TensorFlow
- Experience with SWarp, PSFEx, and analogous softwares

## Research

*Scientific interests*

- Galaxy formation and evolution • IR and (sub)mm astronomy • High-z galaxies • Strong gravitational lensing • Multi-wavelength surveys • Astrophysical applications of machine learning

*International collaborations*

- Member of the **COSMOS** and **COSMOS-Web** collaborations
- Member of the **Euclid Consortium** (Galaxy Evolution and Strong gravitational lensing Science Working Groups)
- Member of the **ELSA** (Euclid Legacy Science Advanced Analysis Tools) project
- DPo Delegate for the **Vera Rubin Observatory** collaboration

*Contributed talks*

- *"ALMA Vs JWST: What's the best way of selecting dusty galaxies?"* **(COSMOS Meeting 2025, Marseille (FR), May 2025)**
- *"Massive and dusty galaxies: a radio + JWST perspective"* **(Big Galaxies, Big Problems, Leiden (NL), April 2025)**
- *"How to form and destroy your (massive) disk"* **(Euclid from Q1 to DR1, Tenerife (ES), January 2025)**
- *"Form and substance in galaxy quenching: A first analysis with Euclid Q1 Data"* **(ELSA Collaboration Meeting, Bristol (UK), January 2025)**
- *"Dark progenitors and massive descendants: An ALMA/JWST perspective on Radio-Selected NIRdark galaxies"* **(ALMABO 2024, Bologna (IT), September 2024)**
- *"Radio-Selected NIRdark galaxies in COSMOS-Web: A JWST view behind the dust"* **(COSMOS Meeting 2024, Kashiwa (JP), July 2024)**
- *"Dark progenitors and massive descendants: an ALMA/JWST perspective on Radio-Selected NIRdark galaxies"* **(Star Formation 2024, Cambridge (UK), April 2024)**
- *"Radio-Selected NIRdark galaxies: likely progenitors of high-z massive galaxies?"* **(EAS2023, Cracow (PL), July 2023)**
- *"Radio-Selected NIRdark galaxies: the ALMA view behind the dust"* **(Observing the mm Universe, Grenoble (FR), June 2023)**
- *"An ALMA/JWST look into Radio-Selected NIRdark galaxies"* **(COSMOS Meeting 2023, Rochester (US), May 2023)**
- *"Radio-Selected NIRdark galaxies: the ALMA view behind the dust"* **(ALMA Meeting for Young Astronomers, Online, March 2023)**

## Research (continued)

- *"Bayesian Neural Networks and strong lensing: towards an uncertainties-aware machine learning algorithm for lens-modelling"* **(EAS2022, Valencia (ES), June 2022)**

*Invited seminars*

- *"Seeing the Unseen: A multi-wavelength quest for optically-dark dusty galaxies"* **(CEA Paris-Saclay, Saclay (FR), May 2025)**
- *"Not-so-little red dots: red and massive sources in the first COSMOS-Web data"* **(National Observatory of Athens, Online, January 2025)**
- *"Radio-Selected NIRdark galaxies: likely progenitors of high-z massive galaxies?"* **(INAF-OACN, April 2023)**
- *"Strong gravitational lensing: a machine learning perspective"* **(INAF-OACN, April 2022)**

*Competitive telescope time*

- **PI:** *"Illuminating the dark side of star formation at* $z > 3$*"* **(ALMA, 27.4h)**
- **PI:** *Disky titans in high-density environments challenging quenching models"* **(NOEMA, 20.0 h)**
- **Co-I:** *"ALMA follow-up of Little Red Dots: Efficiently testing black hole growth/feedback models with multiphase gas kinematics"* **(ALMA, 12.8h)**
- **Co-I:** *"A comprehensive population study of Little Red Dots: Connecting early BH and galaxy growth"* **(JWST, 86.6 h)**
- **Co-I:** *"The obscured Universe at z∼6 on the way to JWST"* **(NOEMA, 27h)**
- **Co-I:** *"The COSMOS High-z ALMA-MIRI Population Survey (CHAMPS): A Wide-Area Comprehensive Survey of the Dusty Universe"* **(ALMA, 143.5h)**
- **Co-I:** *"Caught in the Web: ALMA Data for Every Sub-Millimeter Galaxy Over the COSMOS-Web Survey Field"* **(ALMA, 6.7h)**

*Competitive grants*

- **Co-I:** *"A JWST Archival Analysis of the Most Dust-Obscured Galaxies Across Cosmic Time"* **(JWST AR Program, 2024)**
- **Co-I:** *"Mass profiles of gravitational LEnses: MOdelling with Neural networks and scientific exploitation"* **(INAF Mini-Grant, 2022)**

*Visiting periods*

- **Austin, TX, USA (Oct 2023 - Apr 2024):** Visiting the University of Texas at Austin to work with Dr. Caitlin Casey on the project "Unveiling the dark universe with JWST".
- **Grenoble, FR (May 2023):** Visiting the IRAM headquarter in Grenoble to perform the data reduction of the NOEMA project "The obscured Universe at $z \sim 6$ on the way to JWST"

*Other relevant activities*

- **Co-Supervisor** of Matteo Sapori's MSC thesis at University of Bologna
- **Referee** for *The Astrophysical Journal Letters, The Astrophysical Journal, Astronomy & Astrophysics, Monthly Notices of the Royal Astronomical Society*, and *Open Research Europe*.
- **Member of the LOC** for the conference "Views on the multi-phase interstellar medium in galaxies" (Bologna, September 2024)

# Publications

## Submitted

- **Akins et al. (2024)**: "COSMOS-Web: The over-abundance and physical nature of "little red dots" — Implications for early galaxy and SMBH assembly" **(Submitted to ApJ - ADS Link)**
- **Euclid Collaboration: Busillo et al. (2025)**: "Euclid Quick Data Release (Q1). LEMON – Lens Modelling with Neural networks. Automated and fast modelling of Euclid gravitational lenses with a singular isothermal ellipsoid mass profile" **(Submitted to A&A - ADS Link)**
- **Franco et al. (2025)**: ""COSMOS-Web: Comprehensive Data Reduction for Wide-Area JWST NIRCam Imaging" **(Submitted to ApJ - ADS Link)**
- **Guo et al.**: "Ly-alpha emission reveals two satellite halos around massive groups at $z \sim 3$: the puzzling case of a quiescent central galaxy"**(Submitted to A&A)**
- **Long et al. (2024)**: "The Extended Mapping Obscuration to Reionization with ALMA (Ex-MORA) Survey: $5\sigma$ Source Catalog and Redshift Distribution" **(Submitted to ApJ - ADS Link)**
- **Mazzolari et al.**: "Radio selection of heavily obscured AGN in the J1030 field: unraveling a missing Compton-thick population" **(Submitted to A&A)**
- **Shuntov et al. (2025)**: "COSMOS2025: The COSMOS-Web galaxy catalog of photometry, morphology, redshifts, and physical parameters from JWST, HST, and ground-based imaging" **(Submitted to A&A - ADS Link)**
- **Traina et al.**: "The total star formation rate function: UV and IR contributions up $z \sim 6$ and comparison with state-of-the-art simulations" **(Submitted to A&A)**

## Accepted

- **Euclid Collaboration: Enia et al. (2025)**: "Euclid Quick Data Release (Q1). A first view of the star-forming main sequence in the Euclid Deep Fields" **(Accepted by A&A - ADS Link)**

## 2025

- **Gentile et al. (2025)**: "Going deeper into the dark with COSMOS-Web: JWST unveils the total contribution of Radio-Selected NIRfaint galaxies to the cosmic Star Formation Rate Density" In *Astronomy & Astrophysics, Volume 697, id.A46, 13 pp.*(**ADS Link**)
- **Euclid Collaboration: Mellier et al. (2025)**: "Euclid. I. Overview of the Euclid mission " In *Astronomy & Astrophysics, Volume 697, id.A1, 94 pp* (**ADS Link**)
- **Faisst et al. (2025)**: "COSMOS-Web: The Role of Galaxy Interactions and Disk Instabilities in Producing Starbursts at $z < 4$" In *The Astrophysical Journal, Volume 980, Issue 2, id.204, 12 pp.* (**ADS Link**)
- **McKinney et al. (2025)**: "SCUBADive I: JWST+ALMA Analysis of 289 sub-millimeter galaxies in COSMOS-Web" In *The Astrophysical Journal, Volume 979, Issue 2, id.229, 20 pp.* (**ADS Link**)
- **Toni et al. (2025)**: "The COSMOS-Web deep galaxy group catalog up to $z = 3.7$" In *Astronomy & Astrophysics, Volume 697, id.A197, 17pp.* (**ADS Link**)

## 2024

- **Gentile et al. (2024a)**: "Illuminating the Dark Side of Cosmic Star Formation III: Building the largest homogeneous sample of Radio-Selected Dusty Star-Forming Galaxies in COSMOS with PhoEBO" In *The Astrophysical Journal, Volume 962, id. 26, 16 pp* (**ADS Link**)
- **Gentile et al. (2024b)**: "Dark progenitors and massive descendants: A first ALMA perspective on Radio-Selected NIRdark galaxies in the COSMOS field" In *Astronomy & Astrophysics, Volume 687, id. A228, 18 pp* (**ADS Link**)

## Publications (continued)

- **Gentile et al. (2024c)**: "Not-so-little Red Dots: Two massive and dusty starbursts at $z \sim 5-7$ pushing the limits of star formation discovered by JWST in the COSMOS-Web survey" In *The Astrophysical Journal Letters, Volume 973, id. L2, 8 pp* (**ADS Link**)
- **Euclid Collaboration: Leuzzi et al. (2024)**: "Euclid Preparation: TBD Characterization of Convolutional Neural Networks for the identification of Galaxy-Galaxy Strong Lensing events" In *Astronomy & Astrophysics, Volume 681, id.A68, 23 pp* (**ADS Link**)
- **Langan et al. (2024)**: "ALMA reveals a dust-obscured galaxy merger at Cosmic Noon" In *Astronomy & Astrophysics, Volume 689, id.A283, 10 pp* (**ADS Link**)
- **Traina et al. (2024)**: "A3COSMOS: the total infrared luminosity function and star formation rate density at z=0.5-6" In *Astronomy & Astrophysics, Volume 681, id.A118, 16 pp* (**ADS Link**)

### 2023

- **Gentile et al (2023)**: "LEMON: LEns MOdelling with Neural networks – I. Automated modelling of strong gravitational lenses with Bayesian Neural Networks" In *Monthly Notices of the Royal Astronomical Society, Volume 522, Issue 4, July 2023, Pages 5442–5455* **ADS Link**
- **Behiri et al (2023)**: "Illuminating the Dark Side of Cosmic Star Formation II. A second date with RS-NIRdark galaxies in COSMOS" In *The Astrophysical Journal, Volume 957, Issue 2, id.63, 14 pp.***ADS Link**
- **Busillo et al (2023)**: "CASCO: Cosmological and AStrophysical parameters from Cosmological simulations and Observations - I. Constraining physical processes in local star-forming galaxies" In *Monthly Notices of the Royal Astronomical Society, Volume 525, Issue 4, pp.6191-6213* **ADS Link**
- **Casey et al (2023)**: "COSMOS-Web: An Overview of the JWST Cosmic Origins Survey" In *The Astrophysical Journal, Volume 954, Issue 1, id.31, 32 pp.* **ADS Link**
- **McKinney et al (2023)**: "A Near-Infrared Faint, Far-Infrared-Luminous Dusty galaxy at z∼5 in COSMOS-Web" In *The Astrophysical Journal, Volume 956, Issue 2, id.72, 12 pp.* **ADS Link**
- **Rojas et al (2023)**: "The impact of human expert visual inspection on the discovery of strong gravitational lenses" In *Monthly Notices of the Royal Astronomical Society, Volume 523, Issue 3, pp.4413-4430* **ADS Link**

### 2022

- **Gentile et al (2022)**: Lenses In VoicE (LIVE): searching for strong gravitational lenses in the VOICE@VST survey using convolutional neural networks In *Monthly Notices of the Royal Astronomical Society: Volume 510, Issue 1, pp.500-514.* **ADS Link**

### 2021

- **Cantiello et al (2021)**: The Fornax Deep Survey with VST. IX. Catalog of sources in the FDS area with an example study for globular clusters and background galaxies. In *Astronomy & Astrophysics: Volume 639, id.A136, 23 pp.* **ADS Link**