



## Cristiano Fanelli

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**Gender:** Male **Date of birth:** 08/08/1991 **Nationality:** Italian

### WORK EXPERIENCE

[ 04/2024 – Current ]

#### **Professor**

##### ***DOMiNI - Scuola di Geopolitica***

**City:** Rome | **Country:** Italy

Professor specialized in space economy, space diplomacy, and space defense in the geopolitical context.

[ 02/01/2023 – Current ]

#### **Post-Doctoral researcher in Astrophysics**

##### ***INAF - Istituto Nazionale di Astrofisica***

**City:** Bologna | **Country:** Italy

This study focuses on the physical, chemical, and kinematic properties of Galactic stellar populations. The research involves analyzing optical and infrared spectra using echelle spectrographs, determining chemical abundances, and measuring various stellar and kinematic parameters, such as effective temperature, gravity, and radial velocity. The team also develops software tools in python and fortran for computing synthetic stellar spectra, model atmospheres, and for reducing and analyzing observed spectra. Additionally, they create software for planning observations and analyzing chemical abundances for the MOONS GTO Galactic Survey using the VLT-MOONS multi-object spectrograph.

[ 25/09/2023 – Current ]

#### **AIAIG Board member (Advisor)**

##### ***AIAIG - Associazione Analisti di Intelligence e Geopolitica***

**City:** Roma | **Country:** Italy

Provides strategic advice and support to improve information gathering and analysis operations, as well as ensure the security and effectiveness of intelligence activities. This role may involve planning, threat assessment, resource management, and strategy development.

[ 09/2022 – Current ]

#### **Space intelligence (SpaceINT) group Team Leader**

##### ***AIAIG - Associazione Analisti di Intelligence e Geopolitica***

**City:** Rome | **Country:** Italy

As the leader of the SpaceINT group, my primary responsibility is to train intelligence analysts on space-related intelligence reporting. The topics include the new space economy, Earth observation, the relationship between space and sustainability/ climate change, defense and security in and from space, anti-satellite weapons (ASAT), geopolitics of space, critical space infrastructure and the strategic importance of space for Italy and Europe.

[ 27/03/2022 – 04/10/2023 ]

#### **CEO & Co-Founder**

##### ***LEOgistic Space Solutions S.r.l.***

**City:** Bologna | **Country:** Italy

As the co-founder and CEO of LEOgistics Space Solutions, a start-up company focused on developing and commercializing collision avoidance and space

infrastructure services, as well as producing data for space traffic management, I am responsible for managing and leading the company. My specific role includes creating AI codes for detecting objects in orbit and developing hardware for tracking active satellites, as well as producing reports on topics related to space consulting. Additionally, I handle relationships with investors and collaborators.

Winner of the Scientifica International competition (150K euro) for the use of AI for Space Traffic Management in 20/07/2022, Rome.

[ 01/2021 – Current ]

### **Naval Intelligence (NavINT) group staff**

**AIAIG - Associazione Analisti di Intelligence e Geopolitica**

**City:** Rome | **Country:** Italy

I deal with the statistical part of events related to geopolitics and the security of the Nations of interest (elections, demonstrations, bill proposals, terrorist acts) related to naval phenomena in strategic positions (choke points). I also analyze atmospheric phenomena and other natural situations that condition naval activities.

[ 12/07/2022 – 09/12/2022 ]

### **High Performance Computing Specialist**

**CINECA**

**City:** Bologna | **Country:** Italy

During my internship, I was part of a team responsible for creating and maintaining high-performance computing clusters. My tasks included installing libraries and software, analyzing the output of complex codes, debugging, and other related activities.

After my internship ended, I was offered a full-time position, but I declined it to pursue research, particularly in the field of space and astrophysics.

## **EDUCATION AND TRAINING**

[ 01/11/2018 – 30/06/2022 ]

### **Ph.D. in Astrophysics**

**Università degli studi di Bologna - INAF-OAS Bologna**

**City:** Bologna | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics | **Thesis:** Unveiling the unknown of cool stars with high resolution spectroscopy

[ 12/01/2018 – 18/07/2018 ]

### **Postgraduate Degree in "Space Institutions and Policies"**

**SIUI - United Nation Association of Italy & ASI - Agenzia Spaziale Italiana**

**City:** Rome | **Country:** Italy | **Field(s) of study:** Business, administration and law:  
• *Management and administration* | **Thesis:** Long-term sustainability of space activities: work in progress and international convergence projects

[ 28/09/2015 – 16/03/2018 ]

### **Master of Science in Astrophysics & Cosmology**

**Università degli studi di Bologna**

**Field(s) of study:** Natural sciences, mathematics and statistics | **Thesis:** Radiative transfer modeling for AGN feedback

[ 19/09/2011 – 17/09/2015 ]

### **Bachelor of Science in Astronomy**

**Università degli studi di Bologna**

**Field(s) of study:** Natural sciences, mathematics and statistics | **Thesis:** Caratteristiche principali dell'emissione di galassie a spirale

[ 09/2005 – 06/2010 ]

### **Aviation high school graduation**

**Istituto Tecnico Aeronautico F. De Pinedo**

**Field(s) of study:** Engineering, manufacturing and construction

## LANGUAGE SKILLS

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**Mother tongue(s):** Italian

**Other language(s):**

**English**

LISTENING C1 READING C1 WRITING C1

SPOKEN PRODUCTION C1 SPOKEN INTERACTION C1

**French**

LISTENING A1 READING A1 WRITING A1

SPOKEN PRODUCTION A1 SPOKEN INTERACTION A1

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## DIGITAL SKILLS

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**My Digital Skills**

FORTRAN 77/90/95 | Microsoft Office | Microsoft Word | Team-work oriented | Organizational and planning skills | Critical thinking | Deep Learning | Data Analytics & Data Mining | Machine Learning | Python (Proficient in working with numpy, pandas, matplotlib, astropy, ipywidgets) | Data Science | Data Collection, Data Processing, Data Analysis, Data Visualisation | Strong sense of leadership | Skills to motivate the team, achieve goals

## PUBLICATIONS

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[ 2024 ] **STRATEGIA E INDIPENDENZA SPAZIALE EUROPEA: dinamiche di investimento nei lanciatori Medium-Heavy e analisi operatività in MEO**

**Reference:** in publication

Authors: **Fanelli, C.** et al.

[ 2023 ] **[Minacce alla supply chain dei lanciatori spaziali](#)**

**Reference:** Scenari

Authors: **Cristiano Fanelli** et al.

**First Evidence of Multi-iron Subpopulations in the Bulge Fossil Fragment Candidate Liller 1**

ApJ - The Astrophysical Journal - 2023ApJ...951...17C

Authors: Crociati, Chiara ; Valenti, Elena; Ferraro, Francesco R.; Pallanca, Cristina; Lanzoni, Barbara; Cadelano, Mario; **Fanelli, Cristiano**; Origlia, Livia; Leanza, Silvia; Dalessandro, Emanuele; Mucciarelli, Alessio; Rich, R. Michael

**Ongoing hierarchical massive cluster assembly: The LISCA II structure in the Perseus complex**

A&A - Astronomy & Astrophysics - 2023A&A...674A..93D

Authors: Della Croce, A.; Dalessandro, E.; Livernois, A.; Vesperini, E.; **Fanelli, C.**; Origlia, L.; Bellazzini, M.; Oliva, E.; Sanna, N.; Varri, A. L.

[ 2022 ] **Lithium detection in red supergiant stars of the Perseus Complex**

**Reference:** ApJ - The Astrophysical Journal - 2022ApJ...931...61F

Authors: **Fanelli, C.**; Origlia, L.; Mucciarelli, A.; Sanna, N.; Oliva, E. and Dalessandro, E.

[ 2022 ] **Stellar population astrophysics (SPA) with the TNG. The chemical content of the red supergiant population in the Perseus complex**

**Reference:** A&A - Astronomy and Astrophysics - 2022A&A...660A...7F

Authors: **Fanelli, C.**; Origlia, L.; Oliva, E.; Dalessandro, E.; Mucciarelli, A. and Sanna, N.

[ 2021 ] **Lo scienziato Giacobino - Analisi di un'opera scientifica del XVIII secolo mai diventata tale**

**Reference:** Giornale di Astronomia - 48, 3, 2021; 24-30 p.

Authors: **Fanelli, C.** and Bordignon S.

[ 2021 ] [L'interdizione dello stretto di Hormuz: la strategia asimmetrica Iraniana](#)

**Reference:** L'orizzonte degli eventi - Quaderni geopolitici e analisi giuridiche

Authors: **C. Fanelli**; P.A. Gemelli; M. Nima Lacerra; S. Pittorru; L. Vulpetti

[ 2021 ] **First Phase Space Portrait of a Hierarchical Stellar Structure in the Milky Way**

**Reference:** ApJ - The Astrophysical Journal - 2021ApJ...909...90D

Authors: Dalessandro, E.; Varri, A. L.; Tiongco, M.; Vesperini, E.; **Fanelli, C.**; Mucciarelli, A.; Origlia, L.; Bellazzini, M.; Saracino, S.; Oliva, E.; Sanna, N.; Fabrizio, M.; Livernois, A.

[ 2021 ] **Stellar population astrophysics (SPA) with the TNG. The Arcturus Lab**

**Reference:** A&A - Astronomy and Astrophysics - 2021A&A...645A..19F

Authors: **Fanelli, C.**; Origlia, L.; Oliva, E.; Mucciarelli, A.; Sanna, N.; Dalessandro, E.; Romano, D.

## HONOURS AND AWARDS

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[ 02/2024 ] **Artificial Intelligence Grant Awarding institution:** INAF

I successfully obtained a grant of approximately 20k euros to design a neural network capable of extracting stellar parameters and chemical abundances from stellar spectra, particularly those from upcoming astrophysical spectroscopic surveys.

[ 18/11/2023 ] **National expert IA member Awarding institution:** IDIA – Dentro l'intelligenza artificiale

Participated as an expert in the delegation responsible for drafting a policy document on artificial intelligence for public consultation, at the IDIA – Dentro l'intelligenza artificiale event, organized by Movimento 5 stelle.

[ 20/07/2022 ] **Super Sapiens Day 2022 Awarding institution:** Scientifica Venture Capital

Winner of the Scientifica International competition (150K euro) for the use of AI for Space Traffic Management.

### Research Activity

#### Space Intelligence (SpaceINT)

My research in the SpaceINT field mainly focuses on studying safety within the space industry, particularly concerning satellites and launch vehicles, as well as the security of satellites and orbital platforms in space. I have been assigned the role of creator and coordinator for a SpaceINT educational program at an Italian geopolitics school, scheduled to commence in 2024 in Rome.

#### Satellites & Space Debris Observation

- Analyzing satellite and space debris in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) using optical observations and data processing techniques.
- Artificial Intelligence software/codes development of for recognition of satellites and space debris in LEO/MEO.
- An analysis of the technology transfer in the space industry (in particular within the SST and SSA context) within Italy and to other countries such as France, China and India.

#### Stellar Astrophysics & Spectroscopy

- Physical, chemical and kinematic study of Galactic stellar populations.
- Analysis of optical and infrared medium and high-resolution spectra obtained with echelle spectrographs.
- Derivation of chemical abundances, stellar and kinematic parameters (effective temperature, gravity, radial velocity, micro- and macro-turbulence velocity, rotational velocity) for both cool and hot giant stars.
- Development of python and Fortran software tools to compute suitable stellar synthetic spectra (by means of radiative transport codes), stellar model atmospheres, and for the reduction and analysis of observed spectra.
- Proactive contribution to observational proposal preparation, in particular the selection of the optimal spectrograph configurations (grating/resolution) for chemical analysis.

#### Observative experience

- TNG Visitor at La Palma, Canary Islands, Spain (28 June 2019–7 July 2019): 8 nights of observations with GIANO-TNG in the context of SPA – Stellar Population Astrophysics Large Program.
- Observative run at Loiano, Bologna (21–26 January 2020): 5 observation nights with BFOSC@CASSINI under the program “A pilot project to explore the potential use of the Cassini telescope for Galactic Archeology”.

#### Marco Polo Fellowship:

- I spent a few months (October 2022–November 2022) visiting the Laboratory Lagrange, Observatoire de la Cote d’Azur in Nice, France, under the supervision of Prof. Mathias Schultheis. There I developed a specific python tool based on machine learning techniques to optimally select targets for phase 1 observation preparation of the MOONS GTO Galactic Survey.

### **Participation to international conferences:**

- EAS 2021 | Session SS33: Star clusters to the next scale: reading the Local and high-z Universe with new giant eyes – ePoster: "High-resolution NIR spectroscopy of red supergiants: tracing Galactic young cluster formation and early evolution".
- LOC at IAU 351 (27-31 May 2019) MODEST19 – “Star Clusters: From the Milky Way to the Early Universe”, Bologna.

## **PROFESSIONAL COURSES & INTERNSHIP**

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- [ 08/11/2022 – 11/11/2022 ] **Introduction to modern Fortran, CINECA, Bologna**
- [ 04/07/2022 – 15/07/2022 ] **HPC summer school in Parallel Computing, CINECA, Bologna**
- [ 13/10/2017 – 17/11/2017 ] **HPC methods for Computational Fluid Dynamics and Astrophysics, CINECA, Bologna**
- [ 19/10/2017 – 20/10/2017 ] **Python for massive data processing, CINECA, Bologna**
- [ 16/10/2017 – 18/10/2017 ] **Python for computational science, CINECA, Bologna**

## **PHD/POSTDOC SCHOOL**

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- [ 19/06/2023 – 23/06/2023 ] **Summer School for Astrostatistics in Crete**
- [ 04/04/2022 – 07/04/2022 ] **Stellar nucleosynthesis and Galactic chemical evolution, Bologna**
- [ 02/02/2022 – 10/02/2022 ] **Python, we have a problem! (or more than one. . . ), Bologna**
- [ 05/05/2021 – 14/05/2021 ] **Writing, talking and presenting science, Bologna (online)**
- [ 17/09/2020 – 20/09/2020 ] **GAIA: Great Advances In Astrophysics, Bologna (online)**
- [ 17/06/2019 – 25/06/2019 ] **Statistics for Astrophysics, Bologna**

## **TEACHING & OUTREACH**

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- [ 10/2019 – 06/2022 ] **University Teaching Tutor**  
Laboratory teaching assistant for the "Ottica Astronomica" course, Bachelor of Science in Astronomy; Bologna, Italy
- [ 12/01/2018 – 18/07/2018 ] **SIOI Master Tutor**  
Master tutor for the postgraduate course in "Space Institutions and policies" in collaboration  
with SIOI - United Nations Association of Italy & ASI - Agenzia Spaziale Italiana; Rome, Italy
- [ 12/09/2022 – 12/09/2022 ] **Lecture on Space and Climate Change as invited young scientist**  
Public awareness event on the issue of climate change from a "space perspective", organized  
by Movimento 5 Stelle; Sala del consiglio comunale, Forlì, Italy

### General skills

- Team-work: I am used to work with cross-disciplinary teams on different scientific problems with dedication and team spirit. I collaborate with both senior and junior observational and theoretical scientists.
- Communication skills: working with cross-disciplinary national and international teams allowed me to refine my communication skills, in particular my attitude to exchange information and to share expertise, which are key elements to approach a scientific problem from different perspectives.
- Software skills: thanks to the experience I am currently completing at CINECA as High Performance Computing specialist, I have been able to learn the fundamentals of parallel and high-performance computing, as well as code optimization, which I would like to apply in stellar astrophysics. Indeed, in the era of large spectroscopic surveys, machine learning and big data analysis techniques are essential to treat large amounts of data with the necessary high-quality standards for precise and accurate measurements of astrophysical quantities.
- Curiosity and Vocation: in my short career, particularly in the last few months after my PhD, I had the privilege to explore other job opportunities, by founding an artificial intelligence-themed startup and doing an internship in CINECA. This experience made me realizing how much I am inspired by research, being driven by vocation and genuine curiosity.

### Organizational / managerial skills

- 2019–2021 – Organizer of the seminar series for PhD students (WPS - Weekly PhD Seminars).
- 2019–2021 – PhD student representative for the departmental Giunta and Council.

### Computer skills

- Excellent in Python programming
- Very good in Fortran 90/95 programming
- Good in Parallel Computing
- Good in codes optimizations and parallelization

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*Autorizzo il trattamento dei miei dati personali presenti nel curriculum vitae ai sensi del Decreto Legislativo 2018/101 e del GDPR (Regolamento UE 2016/679)*

Bologna, 09/04/2024