



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

DIPARTIMENTO  
DI FISICA E ASTRONOMIA  
"AUGUSTO RIGHI"

FORM TO BE FILLED AND ATTACHED TO CV IN THE APPLICATION

This call for a research fellowship is open to candidates in possession of one of the following requirements:

- to be a citizen of Ukraine,
- to be refugee from Ukraine
- to be refugee in Ukraine
- to hold a permanent residence permit in Ukraine
- to hold a 2nd cycle/specialist degree or degree from previous system or equivalent qualification in Astrophysics or Physics.

THE UNDERSIGNED

SURNAME \_\_\_\_\_

NAME \_\_\_\_\_

BORN IN \_\_\_\_\_ (PROVINCE/COUNTRY \_\_\_\_\_)

ON \_\_\_\_\_ (fill in exactly the same personal details as shown in the enclosed copy of passport or identity document)

E-MAIL (compulsory) \_\_\_\_\_

HEREBY APPLIES

for the call for the selection running at DIPARTIMENTO DI FISICA E ASTRONOMIA of the Alma Mater Studiorum University of Bologna for the award of 1 grant research fellowship, for the execution of research activities, even remotely, within the project entitled "Constraining dark matter with cosmic web analysis", according to the annexed Activity Programme for 12 (twelve) months;

AND DECLARES:

- to be a citizen of Ukraine
- to be a refugee from Ukraine
- to be a refugee in Ukraine
- to hold a permanent residence permit or international protection in Ukraine

AND ENCLOSES THE FOLLOWING DOCUMENTS:

- scanned copy of the passport or valid Identification Card and, only for non-Ukrainian citizens, of the residence permit or international protection in Ukraine;
- a duly signed declaration indicating the eligibility for one of the above-mentioned categories;
- scientific and professional curriculum vitae also containing scientific productivity.

Viale Berti Pichat 6/2 - 40127 Bologna - Italia - Tel. +39 051 2095162

Via Irnerio 46 - 40126 Bologna - Italia - Tel. +39 051 2091004

Via Gobetti 93/2 - 40129 Bologna - Italia - Tel. +39 051 2095701

[difa.direzione@unibo.it](mailto:difa.direzione@unibo.it) - [difa.dipartimento@pec.unibo.it](mailto:difa.dipartimento@pec.unibo.it)

<https://fisica-astronomia.unibo.it/it>



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As required by the call, In the online application, following the web procedure instructions, candidates must indicate, under their own responsibility:

- surname and name;
- date and place of birth;
- nationality;
- residence and chosen address for correspondence for the purposes of this selection;
- that they do not have a criminal record and are not involved in any current criminal proceedings (or if so, state which);
- that they have the qualification required by art. 2 of the call for applications, specifying the University and year in which it was obtained or that they possess an academic qualification obtained abroad, which is deemed equivalent.

Date, Signature \_\_\_\_\_

Processing of personal data Personal data collected are processed as described in the "Privacy policy for participants in the University's competitive selection procedures" available at: [www.unibo.it/privacy](http://www.unibo.it/privacy)



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DIPARTIMENTO DI FISICA E ASTRONOMIA  
Department of Physics and Astronomy - DIFA

## Post-Doctoral research project in ASTROPHYSICS

**Title of the Project: Constraining dark matter with cosmic web analysis**

*Una ricostruzione delle proprietà della materia oscura tramite l'analisi della rete cosmica*

**Supervisor :** Prof. Franco Vazza (Physics and Astronomy Department, University of Bologna)

**Scientific Case:** Cosmological simulations are the most sophisticated tool we have to connect astrophysical processes to the cosmological evolution of large scale structures. In particular, they allow us to link in detail the fundamental properties of dark matter with the large-scale distribution of matter in the cosmic web, where galaxies form and evolve.

The large-scale structure in the Universe is organised in a complex network of filaments connecting virialized halos, and separated by voids. The analysis of the topology and connectivity of elements in this network can give important inputs to cosmological studies, as well as enable observational studies to constrain the properties of possible dark matter candidates. In an epoch of multi-wavelength surveys capable of probing the cosmic web evolution up to a very large redshift, the combination of advanced cosmological numerical simulations of the cosmic web with additional numerical or semi-analytical approaches to predict the properties of galaxies as a function of several dark matter candidates scenarios.

**Outline of the Project:** The Post Doctoral candidate will use existing or new cosmological simulations as a tool to connect the clustering and evolutionary properties of galaxies to the study of dark matter. The candidate must be expert in the simulation of several plausible dark matter candidates (e.g. warm dark matter, cold dark matter, fuzzy dark matter etc) and in relating them with potentially observable astrophysical processes related to the evolution of galaxies (e.g. luminosity functions, clustering properties etc).

The Post Doctoral candidate will be involved in the ongoing observational and numerical activities of the PI's group (<https://cosmosimfrazza.myfreesites.net/erc-magcow>) and will have the chance of producing new exciting numerical simulations on some of the largest Supercomputers in the world.



Given that the expected work is going to be essentially theoretical/numerical, it will be entirely possible to fully conduct this work remotely, i.e. elsewhere from the location of the Host Institution, just by regularly meeting online with the PI

**Contacts:** [franco.vazza2@unibo.it](mailto:franco.vazza2@unibo.it)

