

PhD thesis available for Cycle 38 (2022-2025)

9 PhD positions are available in this cycle.

3 positions are funded by DIFA(UNIBO). The theses have to be selected among the following 37 proposals

DIFA(UNIBO) – Project 1

Testing fundamental physics with numerical simulations of the cosmic large-scale structures

Supervisor: Dr. Marco Baldi

Contact: Prof. Marco Baldi, marco.baldi5@unibo.it

DIFA(UNIBO) – Project 2

Studying massive quiescent galaxies at $z=2$ with the James Webb Space Telescope

Supervisor: Sirio Belli

Contacts: sirio.belli@cfa.harvard.edu, sirbelli@gmail.com

DIFA(UNIBO) – Project 3

Magnetic fields in galaxy clusters

Supervisor : Annalisa Bonafede **Co-Supervisors :** Chiara Stuardi, Franco Vazza

Contacts: annalisa.bonafede@unibo.it

DIFA(UNIBO) – Project 4

The large scale structure of the Universe at ultra low radio frequencies

Supervisor : Annalisa Bonafede **Co-Supervisors:** Francesco de Gasperin

Contacts: Francesco de Gasperin fdg@ira.inaf.it

DIFA(UNIBO) – Project 5

Physics of non-thermal components in galaxy clusters and the LOFAR revolution

Supervisor : A. Bonafede **Co-Supervisors :** G. Brunetti (IRA INAF)

Contacts: brunetti@ira.inaf.it, gianfranco.brunetti@inaf.it

DIFA(UNIBO) – Project 6

Black Hole Weather: Unveiling the micro and macro processes of SMBH feeding and feedback

Supervisor: Marcella Brusa, **Co-Supervisor:** Massimo Gaspari (INAF)

Contact: marcella.brusa3@unibo.it

DIFA(UNIBO) – Project 7

Constraining the expansion of the Universe with the oldest stars

Supervisor: Andrea Cimatti **Collaborators:** M. Moresco,

Contacts: a.cimatti@unibo.it

DIFA(UNIBO) – Project 8

Dynamics of galaxies in the Cluster Environment

Supervisor : Luca Ciotti

Contacts: luca.ciotti@unibo.it

DIFA(UNIBO) – Project 9

The role of relativistic jets in the assembly of the first supermassive black holes: a multi-band approach

Supervisor : Prof. Daniele Dallacasa Co-Supervisors : Dott. Marcello Giroletti (INAF-IRA),
Dott. Giulia Migliori (INAF-IRA), Dott. Cristiana Spingola (INAF-IRA)

Contacts: Prof. Daniele Dallacasa (ddallaca@ira.inaf.it)

DIFA(UNIBO) – Project 10

Substructure lensing at milliarcsecond angular resolution

Supervisor: D. Dallacasa, Dr. C. Spingola – Dr. M. Giroletti (INAF-IRA)

Contacts: Cristiana Spingola (INAF-IRA) spingola@ira.inaf.it

DIFA(UNIBO) – Project 11

Searching for water on Mars: global mapping of the dielectric properties at the base of the Martian polar caps

Supervisor: D. Dallacasa

Co-supervisor: Dott. R. Orosei (INAF-IRA)

Contacts: Dott. Roberto Orosei (roberto.oroisei@inaf.it)

DIFA(UNIBO) – Project 12

Development of techniques and tools for the image processing of radar signals for the observation of planetary bodies: from the subsurface of Mars to asteroids

Supervisor: D. Dallacasa

Co-supervisor: Dott. R. Orosei (INAF-IRA)

Contacts: Dott. Roberto Orosei (roberto.oroisei@inaf.it)

DIFA(UNIBO) – Project 13

Solar Physics and Space Weather with the Medicina 32-m Radio Telescope: Development, Test and Scientific Exploitation of a Spectro-Polarimetric Imaging System for Solar Radio Astronomy

Supervisor: D. Dallacasa

Co-supervisor: Simona Righini (INAF-IRA), Alberto Paolo Pellizzoni (INAF-OAC)

Contacts: Dott. Simona Righini (simona.righini@inaf.it)

DIFA(UNIBO) – Project 14

Playing with the physics of Blue Stragglers

Supervisor: F.R.Ferraro Co-supervisors: B. Lanzoni, C. Pallanca, M. Cadelano

Contacts: Prof. F.R. Ferraro (francesco.ferraro3@unibo.it)

DIFA(UNIBO) – Project 15

AGN feeding-feedback cycle in cool core clusters with H α nebulae

Supervisors : Myriam Gitti (DIFA), Fabrizio Brighenti (DIFA)

Contacts: myriam.gitti@unibo.it

DIFA(UNIBO) – Project 16

Simulating super-bubble dynamics in star-forming galaxies with explicit ISM and stellar feedback models

Supervisor: Federico Marinacci

Contacts: Federico Marinacci (federico.marinacci2@unibo.it)

DIFA(UNIBO) – Project 17

Cosmology with Bayesian deep neural networks to learn the properties of the Cosmic Web

Supervisor: Prof. Federico Marulli Co-Supervisors : Prof. Lauro Moscardini, Dr. Alfonso Veropalumbo
Contacts: Federico Marulli (federico.marulli3@unibo.it)

DIFA(UNIBO) – Project 18

Cosmological exploitation of the statistical properties of Cosmic Voids

Supervisor: Prof. Federico Marulli Co-Supervisor: Prof. Lauro Moscardini
Contacts: Federico Marulli (federico.marulli3@unibo.it)

DIFA(UNIBO) – Project 19

Strong Gravitational Lensing - simulating and modelling

Supervisor: Dr. Robert Benton Metcalf
Contacts: Prof. Robert Benton Metcalf (robertbenton.metcalf@unibo.it)

DIFA(UNIBO) – Project 20

Weak Gravitational Lensing with the Lyman-alpha Forest

Supervisor : Prof. R. Benton Metcalf
Contacts: Prof. Robert Benton Metcalf (robertbenton.metcalf@unibo.it)

DIFA(UNIBO) – Project 21

Exploiting Gravitational Waves as cosmological probes in view of the new upcoming large GW and galaxy surveys

Supervisor: Michele Ennio Maria Moresco Cosupervisors: A. Cimatti
Contacts: Dott. Michele Ennio Maria Moresco (michele.moresco@unibo.it)

DIFA(UNIBO) – Project 22

Cosmological constraints from the cross-correlation of Gravitational Waves and galaxy catalogs

Supervisor: Michele Ennio Maria Moresco Cosupervisors: A. Cimatti, F. Marulli
Contacts: Dott. Michele Ennio Maria Moresco (michele.moresco@unibo.it)

DIFA(UNIBO) – Project 23

21 cm cosmology

Supervisors: Prof. Lauro Moscardini Co-Supervisors: Dr. Gianni Bernardi, Dr. Marta Spinelli
Contacts: Lauro Moscardini (lauro.moscardini@unibo.it)

DIFA(UNIBO) – Project 24

Cosmology with Galaxy Clusters

Supervisor: Prof. Lauro Moscardini Co-Supervisor: Prof. Federico Marulli
Contacts: Lauro Moscardini (lauro.moscardini@unibo.it)

DIFA(UNIBO) – Project 25

Detecting galaxy clusters and cosmic voids in Weak Lensing Simulations: paving the way to the ESA-Euclid Mission

Supervisor: Prof. Lauro Moscardini Co-Supervisors: Dr. Carlo Giocoli, Prof. Federico Marulli, Priv.-Doz. Dr. Matteo Maturi
Contacts: Lauro Moscardini (lauro.moscardini@unibo.it)

DIFA(UNIBO) – Project 26

The physical properties of star-forming regions in lensed high redshift galaxies

Supervisor: Prof. Lauro Moscardini Co-Supervisors: Massimo Meneghetti, Eros Vanzella, Francesco Calura
Contacts: Lauro Moscardini (lauro.moscardini@unibo.it)

DIFA(UNIBO) – Project 27

Chemical characterization of the Local Group: identifying the chemical DNA of Milky Way satellite galaxies

Supervisor : Prof. Alessio Mucciarelli (DIFA) Co-Supervisors : Davide Massari (INAF)

Contacts: alessio.mucciarelli2@unibo.it

DIFA(UNIBO) – Project 28

Very metal-poor stars as local relics of the ancient Universe

Supervisor: Prof. Alessio Mucciarelli (DIFA) Co-supervisor: Dr. Carmela Lardo (DIFA)

Contacts: alessio.mucciarelli2@unibo.it

DIFA(UNIBO) – Project 29

Globular Cluster evolution in dwarf satellites

Supervisor: Carlo Nipoti (UniBO) Co-supervisor: Francesco Calura (INAF-OAS)

Contacts: carlo.nipoti@unibo.it

DIFA(UNIBO) – Project 30

Rotating astrophysical fluids with baroclinic distributions

Supervisors: Carlo Nipoti Luca Ciotti (UniBo)

Contacts: carlo.nipoti@unibo.it

DIFA(UNIBO) – Project 31

Rotation of the intracluster medium: theoretical models and observational perspectives

Supervisor : Carlo Nipoti (UniBO) Co-Supervisor : Stefano Ettori (INAF-OAS Bologna)

Contacts: carlo.nipoti@unibo.it

DIFA(UNIBO) – Project 32

: Multi-component models of stellar systems with distribution functions depending on actions

Supervisor: Carlo Nipoti Co-supervisor: Raffaele Pascale (INAF-OAS)

Contacts: carlo.nipoti@unibo.it

DIFA(UNIBO) – Project 33

A radio perspective on star formation in the J1030 field

Supervisors : Margherita Talia (DiFA); Isabella Prandoni (IRA) Co-Supervisors : Francesca Pozzi (DiFA); Roberto Gilli (OAS)

Contacts: Margherita Talia (margherita.talia2@unibo.it)

DIFA(UNIBO) – Project 34

Tracing the Early Cluster Assembly with Accreting Black Holes

Supervisor: Cristian Vignali (DIFA) Co-Supervisors: F. Vito, S. Marchesi (INAF-OAS)

Contacts: cristian.vignali@unibo.it

DIFA(UNIBO) – Project 35

The realm of dual super-massive black holes

Supervisor: C. Vignali (DIFA) Co-supervisors: A. De Rosa (INAF-IAPS), P. Severgnini (INAF-Brera)

Contacts: cristian.vignali@unibo.it

DIFA(UNIBO) – Project 36

A systematic search for ultra-bright high-redshift strongly lensed galaxies in Planck catalogues

Supervisor: C. Vignali (DIFA) Co-supervisors: M. Bonato (INAF-IRA)

Contacts: cristian.vignali@unibo.it

DIFA(UNIBO) – Project 37

Exploiting deep radio surveys to assess the growth of black holes and the role of jet-induced AGN feedback in galaxy evolution

Supervisor: Cristian Vignali (DIFA); Co-Supervisor: I. Prandoni (INAF-IRA)

Contacts: cristian.vignali@unibo.it

3 positions are funded by INAF. The theses have to be selected as follows

INAF1

INAF1 – “Study of magnetic field in galaxies from dust polarized emission”

Supervisor: Rosita Paladino rosita.paladino@inaf.it

INAF2 = One choice among the following 14 projects

INAF2 – Project 1

Stellar clusters in the era of Gaia and large spectroscopic surveys

Supervisor: Dr. Angela Bragaglia

Contact: Dr. Angela Bragaglia, angela.bragaglia@inaf.it

INAF2 – Project 2

Galaxy evolution with distribution functions of physical properties on the way to Euclid

Supervisor: Dr. Micol Bolzonella

Contacts: Micol Bolzonella (micol.bolzonella@inaf.it)

INAF2 – Project 3

Development, integration, testing and exploitation of high energy astrophysics satellite missions

Supervisor: Dr. Riccardo Campana

Contacts: riccardo.campana@inaf.it

INAF2 – Project 4

Mass assembly at $z > 2$: galaxy and structure formation in protoclusters

Supervisor: Dr. Olga Cucciati
Contacts: Olga Cucciati (olga.cucciati@inaf.it)

INAF2 – Project 5

Studying ultra fast outflows in AGN using physical models

Supervisor: Dr. Mauro Dadina
Contacts: mauro.dadina@inaf.it

INAF2 – Project 6

Quasars at the dawn of cosmic time

Supervisor: Dr. Roberto Decarli
Contacts: roberto.decarli@inaf.it

INAF2 – Project 7

Tracing the cosmic web in X-ray and radio bands

Supervisor: Dr. Stefano Etori
Contacts: stefano.ettori@inaf.it

INAF2 – Project 8

The future of the cosmic microwave background through anisotropies and spectral distortions

Supervisor: Dr. Fabio Finelli
Contacts: fabio.finelli@inaf.it

INAF2 – Project 9

The Milky Way assembly as traced by its stars and globular Clusters

Supervisor: Dr. Davide Massari
Contacts: davide.massari@inaf.it

INAF2 – Project 10

Machine learning techniques applied to the Gaia, TESS and LSST datasets.

Supervisor: Dr. Tatiana Muraveva
Contacts: tatiana.muraveva@inaf.it

INAF2 – Project 11

Physical properties of galaxies over cosmic time: from present to future perspectives.

Supervisor: Dr. Lucia Pozzetti
Contacts: lucia.pozzetti@inaf.it

INAF2 – Project 12

Chemical enrichment of the Milky Way and its satellites in the Large Survey Era.

Supervisor: Dr. Donatella Romano
Contacts: donatella.romano@inaf.it

INAF2 – Project 13

Investigating the properties of kilonovae.

Supervisor: Dr. Andrea Rossi
Contacts: andrea.rossi@inaf.it

INAF2 – Project 14

Thunderstorms, lightning, and gamma-rays: terrestrial gamma-flashes (TGF) observations from ground, from aircraft, and from the top of a volcano.

Supervisor: Dr. E. Virgili
Contacts enrico.virgilli@inaf.it

INAF3 = One choice among the following 3 projects

INAF3 – Project 1

Three-body problem and physical evolution of natural and anthropic orbiting clouds: the astrophysical context"

Supervisor: Dr. Alberto Buzzoni
Contacts: alberto.buzzoni@inaf.it

INAF3 – Project 2

Geant4 simulations for the design and development of future high energy missions

Supervisor: Dr. V. Fioretti
Contacts: valentina.fioretti@inaf.it

INAF3 – Project 3

Instrumental and systematic effects on the science performances of space missions at Lagrangian Point 2 (L2): Euclid and others

Supervisor: Dr. Edoardo Medinaceli
Contacts: eduardo.medinaceli@inaf.it

Three positions are funded by specific scientific projects

PUBLIC-ENGAGEMENT

Study, design and implementation of innovative public engagement methodologies in radio astronomical projects

Supervisor : Stefania Varano (stefania.varano@inaf.it)

THERMAL&NON-THERMAL

Physics and observables of the thermal and non-thermal output of radio galaxies in large-scale structures

Supervisor: Franco Vazza (franco.vazza2@unibo.it)

COSMIC-LAB

Cosmic-Lab: probing the physics of dense stellar systems

Supervisor: F.R. Ferraro (francesco.ferraro3@unibo.it)