Curriculum Vitae

<div align="right">Enrico Garaldi</div>

Personal information

Date of birth	25 October 1990
Citizenship	Italian
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Personal website	http://wwwmpa.mpa-garching.mpg.de/~egaraldi
Mail address	Wilhelmstraße 15, 80801 Munich, Germany

Scientific interests

Structure formation, young Universe, numerical simulations and methods, radiation transport

Short bio

I am a **numerical astrophysicist with 8 years of active research experience** (4 as PhD student and 4 as postdoctoral Fellow) in 5 institutions across 3 continents. I have **expertise in various fields connected to galaxy formation and cosmology**, including the properties of galaxies in the first billion years of cosmic history, cosmic reionization, magnetogenesis, galaxy formation, beyond-ΛCDM cosmologies and numerical methods. My achievements have been **recognized by the three *summa cum laude* (BSc., MSc. and PhD), prestigious fellowships, awards, computational and observational time in world-leading facilities**. I am currently a Research Fellow at the Institute for Fundamental Physics of the Universe and a CANON Fellow at the University of Osaka. I regularly **supervise** and co-supervise students, **teach** in Master- and PhD-level courses, present my work in international conferences and colloquia as **invited and review speaker**, **contribute to scientific outreach**, and to the academic life.

Research experience and education

2024 **Post-doctoral Research Fellow in Astrophysics**,
Institute for Fundamental Physics of the Universe, *Trieste, Italy*,
Independent position.

2022 **2022** **Canon Fellow (visiting scientist)**,
University of Osaka, *Japan*,
Host: Prof. Ken Nagamine.

2018 **2024** **Post-doctoral Research Fellow in Astrophysics**,
Max-Planck-Institut für Astrophysik, *Garching bei München, Germany*,
Independent position, advisor: Prof. Volker Springel.

2018 **2018** **Visiting scientist**,
University of California Santa Cruz, *U.S.A.*,
Host: Prof. Piero Madau.

2015
2019

PhD in Astrophysics,
Argelander Institut für Astronomie, *Bonn, Germany*,
Supervisor: Prof. Cristiano Porciani.

Thesis title: From galaxies to the cosmic web and back: the interplay of different scales in galaxy formation and cosmic web
Date of defense: 11 October 2019
Evaluation: Summa cum laude

2012
2014

Master's degree in Physics,
University of Bologna, *Italy*,
Supervisors: Prof. Lauro Moscardini and Dr. Marco Baldi.

Thesis title: Numerical simulations of halo segregations in cosmological models with multiple species of interacting dark matter
Date of defense: 24 October 2014
Evaluation: Summa cum laude

2009
2012

Bachelor degree in Physics,
University of Modena and Reggio Emilia, *Italy*,
Supervisors: Prof. Anna Franchini and Prof. Giorgio Santoro.

Thesis title: The role of long-ranged dispersive interactions in the structure of dimers and solids. A comparison between different functionals that include the van der Waals interactions
Date of defense: 26 October 2012
Evaluation: Summa cum laude

Awards, Grants and Fellowships

2024	Research Fellowship at the Institute for Fundamental Physics of the Universe
2023	147 hours of observing time on MUSE (Large program), as co-I
2021–2023	45 million CPU-hours on the SuperMUC-NG machine (LRZ, Germany), as co-I
2021	Canon Fellowship ($\sim$ 8500 EUR, delayed to 2022 because of restrictions due to COVID-19)
2021	Kavli Institute for Astronomy and Astrophysics Fellowship in Beijing (declined)
2021	Research Fellowship at the Max-Planck-Institute für Astrophysik
2019–2021	51 million CPU-hours on the SuperMUC-NG machine (LRZ, Germany), as PI
2019	Summa cum Laude (Ph.D.), University of Bonn
2018	Research Fellowship at the Max-Planck-Institute für Astrophysik
2018, 2019	'Arte o Scienza?' (Art or Science?) exhibition (selected for public display)
2018	John Hunter Excellence in Plotting Contest 2018 (2nd place)
2017	Research exchange grant (5000 EUR) for selected PhD students
2015–2018	International Max Planck Research School (IMPRS) of Bonn and Cologne membership
2014	Summa cum Laude (Master's degree), University of Bologna
2012	Summa cum Laude (Bachelor's degree), University of Modena and Reggio Emilia
2010–2012	Top-5% student ($\sim$2100 EUR, obtained every year), at the University of Modena

Supervision

2022 – 2023 **Supervisor**
Supervisee: Verena Bellscheidt (Intern, Max Planck Institute for Astrophysics, 2022)
Marie Boussard (Intern, Max Planck Institute for Astrophysics, 2023)

2019 – 2023 **Co-supervisor**
Supervisee: Riccardo Zangarelli (MSc. student, Bologna University, 2022 – 2023)
Anshuman Acharya (PhD, Max Planck Institute for Astrophysics, 2022 –)
Arghyadeep Basu (PhD, Max Planck Institute for Astrophysics, 2021 –)
Benedetta Spina (PhD, University of Bonn, 2021 – 2023)
Aniket Bhagwat (PhD, Max Planck Institute for Astrophysics, 2021 –)
Silvia Fiaschi (PhD, Max Planck Institute for Astrophysics, 2019 – 2021)
Akshit Katiyar (Intern, Max Planck Institute for Astrophysics, 2019)

Teaching

2022, 2023 **Lecturer (individual lectures)**
North-West University, South Africa (virtual)
Course: Computational Astrophysics (6 lectures on numerical methods for partial
differential equations, 2 years)

2018 **Lecturer (individual lecture)**
University of Bonn, Germany
Course: Theoretical Astrophysics (1 lecture on cosmic reionization)

2015–2018 **Teaching assistant**
University of Bonn, Germany
Courses: Astrophysics of galaxies (1 semester)
Theoretical Astrophysics (2 semesters)
Observational Cosmology (2 semesters)

2010–2014 **Private instructor** for high-school students
Modena, Italy
Subjects: mathematics, physics
Weekly individual lectures for a total of approximately 30 students.

Service

2019–present **Referee for academics journals**:
The Astrophysical Journal (since 2019)
Monthly Notices of the Royal Astronomical Society (since 2020)
Journal of Open Source Software (since 2023)

2022 **Organizer** of an international conference
May 2022 *Dust and metals during cosmic reionization*, part of the Sazerac-
sip series, online.
May 2023 *Visualizing simulations of turbulence and beyond*, Garching bei
München, Germany.

2021–present **Founder** of a task force to attract master's students at the Max-Planck-Institut für
Astrophysik

2021 **Member** of a committee evaluating the effectiveness of the bias-reduction and inclu-
siveness training performed

2019–2021 **Organizer and chair** of a weekly Galaxy Journal Club

2015–2017 **Student representative** for SFB956 (deputy)

2015–2018 **Member** of the Argelander-Institut für Astronomie Social Committee

━━━━ Publications

Summary I have **published 26 academic papers**, including **10 as first author** and one as shared corresponding author, 4 proceedings and 1 book chapter. In total, I have published papers with **34 different co-authors in 5 different sub-fields** (cosmic reionization, galaxy formation, magnetic fields, alternative gravity theories, numerical methods). After my first (MSc.) publication, I have **consistently published 2 first-author papers per year**, with the exception of 2021, when my biggest research project to date was being developed.

My papers have been **cited 568 times** (as of Oct. 22nd 2023 according to the ADS database). **More than 75% of these citations are in the last 17 months, resulting in an h-index of 13.**

Academic papers

(1) **E. Garaldi**, R. Kannan, A. Smith, J. Borrow, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist, D. Galárraga-Espinosa, J. Y.-C. Yeh, X. Shen, C. Xu, M. Neyer, B. Spina, M. Almualla
The THESAN project: public data release of radiation-hydrodynamic simulations matching reionization-era JWST observations
Monthly Notices of the Royal Astronomical Society (subm.)
arXiv ID: arxiv.org/2309.06475

(2) **E. Garaldi**
CoReCon: an open, community-powered collection of Reionization constraints
Journal of Open Source Software, vol. 8, issue 87, p. 5407 (2023)
DOI: 10.21105/joss.05407

(3) **E. Garaldi**, R. Kannan, A. Smith, V. Springel, R. Pakmor, M. Vogelsberger, L. Hernquist
The THESAN project: properties of the intergalactic medium and its connection to Reionization-era galaxies
Monthly Notices of the Royal Astronomical Society, 512, 4909 (2022)
DOI: 10.1093/mnras/stac257

(4) R. Kannan (co-corresponding author), **E. Garaldi** (co-corresponding author), A. Smith (co-corresponding author), R. Pakmor, V. Springel, M. Vogelsberger, L. Hernquist
Introducing the THESAN project: radiation-magneto-hydrodynamic simulations of the Epoch of Reionization
Monthly Notices of the Royal Astronomical Society, 511, 4005-4030 (2022)
DOI: 10.1093/mnras/stab3710

(5) **E. Garaldi**, R. Pakmor, V. Springel
Magnetogenesis around the first galaxies: the impact of seeding processes on galaxy formation
Monthly Notices of the Royal Astronomical Society, 502, 5726 (2021)
DOI: 10.1093/mnras/stab086

(6) **E. Garaldi**, M. Nori, M. Baldi
Dynamic Zoom Simulations: a fast, adaptive algorithm for simulating lightcones
Monthly Notices of the Royal Astronomical Society, 499, 2685 (2020)
DOI: 10.1093/mnras/staa2064

(7) **E. Garaldi**, N. Gnedin, P. Madau
Constraining the tail-end of reionization using Ly-α transmission spikes
The Astrophysical Journal, 876, 31 (2019)
DOI: 10.3847/1538-4357/ab12dc

(8) **E. Garaldi**, M. Compostella, C. Porciani
The Goldilocks problem of the quasar contribution to reionization
Monthly Notices of the Royal Astronomical Society, 483, 5301 (2019)
DOI: 10.1093/mnras/sty3414

(9) **E. Garaldi**, E. Romano-Díaz, C. Porciani, M. Pawlowski
Radial Acceleration Relation of ΛCDM satellite galaxies
Physical Review Letters, 120, 261301 (2018)
DOI: 10.1103/PhysRevLett.120.261301

(10) **E. Garaldi**, E. Romano-Díaz, M. Borzyszkowski, C. Porciani
ZOMG - III. The effect of Halo Assembly on the Satellite Population
Monthly Notices of the Royal Astronomical Society, 473, 2234 (2018)
DOI: 10.1093/mnras/stx2489

(11) **E. Garaldi**, M. Baldi, L. Moscardini,
Zoomed high-resolution simulations of Multi-coupled Dark Energy: cored galaxy density profiles at high redshift
Journal of Cosmology and Astroparticle Physics, 01, 050 (2016)
DOI: 10.1088/1475-7516/2016/01/050

(12) A. Bhagwat, T. Costa, B. Ciardi, R. Pakmor, **E. Garaldi**
SPICE: the connection between cosmic reionisation and stellar feedback in the first galaxies
Monthly Notices of the Royal Astronomical Society (subm.)

(13) A. Acharya, **E. Garaldi**, B. Ciardi, Q. Ma
Cosmic variance suppression in radiation-hydrodynamic modeling of the reionization-era 21-cm signal
Monthly Notices of the Royal Astronomical Society (subm.)
arXiv ID: arxiv.org:2310.13401

(14) M. Neyer, A. Smith, R. Kannan, M. Vogelsberger, **E. Garaldi**, D. Galárraga-Espinosa, J. Borrow, L. Hernquist, R. Pakmor, V. Springel
The THESAN project: connecting ionized bubble sizes to their local environments during the Epoch of Reionization
Monthly Notices of the Royal Astronomical Society (subm.)
arXiv ID: arxiv.org:2310.03783

(15) X. Shen, J. Borrow, M. Vogelsberger, **E. Garaldi**, A. Smith, R. Kannan, S. Tacchella, J. Zavala, L. Hernquist, J. Yeh, C. Zheng
THESAN-HR: Galaxies in the Epoch of Reionization in warm dark matter, fuzzy dark matter and interacting dark matter
Monthly Notices of the Royal Astronomical Society (subm.)
arXiv ID: arxiv.org:2304.06742

(16) J. Borrow, R. Kannan, **E. Garaldi**, A. Smith, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist
THESAN-HR: How does reionization impact early galaxy evolution?
Monthly Notices of the Royal Astronomical Society, 525, 5932 (2023)
DOI: 10.1093/mnras/stad2523

(17) C. Xu, A. Smith, J. Borrow, **E. Garaldi**, R. Kannan, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist
The THESAN project: Lyman-alpha emitter luminosity function calibration
Monthly Notices of the Royal Astronomical Society, 521, 4356 (2023)
DOI: 10.1093/mnras/stad789

(18) R. Kannan, V. Springel, L. Hernquist, R. Pakmor, A. M. Delgado, B. Hadzhiyska, C. Hernández-Aguayo, M. Barrera, F. Ferlito, S. Bose, S. White, C. Frenk, A. Smith, **E. Garaldi**
The MillenniumTNG Project: The galaxy population at $z \geq 8$
Monthly Notices of the Royal Astronomical Society, 524, 2594 (2023)
DOI: 10.1093/mnras/stac3743

(19) D. Galárraga-Espinosa, **E. Garaldi**, G. Kauffmann,
Flows around galaxies I – The dependency of galaxy connectivity on cosmic environments and effects on the star-formation rate
Astronomy & Astrophysics, 671, 160 (2023)
DOI: 10.1051/0004-6361/202244935

(20) A. Bera, S. Hassan, A. Smith, R. Cen, **E. Garaldi**, R. Kannan, M. Vogelsberger,
Bridging the Gap between Cosmic Dawn and Reionization favors Faint Galaxies-dominated Models
The Astrophysical Journal (subm.)
arXiv ID: arxiv.org:2209.14312

(21) J. Yeh, A. Smith, R. Kannan, **E. Garaldi**, M. Vogelsberger, J. Borrow, Josh, R. Pakmor, V. Springel, L. Hernquist,
The THESAN project: ionizing escape fractions of reionization-era galaxies
Monthly Notices of the Royal Astronomical Society, 520, 2757 (2023)
DOI: 10.1093/mnras/stad210

(22) W. Qin, K. Schutz, A. Smith, **E. Garaldi**, R. Kannan, T. Slatyer, M. Vogelsberger,
An Effective Bias Expansion for 21 cm Cosmology in Redshift Space
Physical Review D, 106, 123506 (2022)
DOI: 10.1103/PhysRevD.106.123506

(23) R. Kannan, A. Smith, **E. Garaldi**, S. Xuejian, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist
The THESAN project: predictions for multitracer line intensity mapping in the epoch of reionization
Monthly Notices of the Royal Astronomical Society, 514, 3857-3878 (2022)
DOI: 10.1093/mnras/stac1557

(24) A. Smith, R. Kannan, **E. Garaldi**, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist
The THESAN project: Lyman-α emission and transmission during the Epoch of Reionization
Monthly Notices of the Royal Astronomical Society, 512, 3243-3265 (2022)
DOI: 10.1093/mnras/stac713

(25) E. Romano-Díaz, **E. Garaldi**, M. Borzyszkowski, C. Porciani
ZOMG - II. Does the halo assembly history influence central galaxies and gas accretion?
Monthly Notices of the Royal Astronomical Society, 469, 1809 (2017)
DOI: 10.1093/mnras/stx878

(26) M. Borzyszkowski, C. Porciani, E. Romano-Díaz, **E. Garaldi**
ZOMG - I. How the cosmic web inhibits halo growth and generates assembly bias
Monthly Notices of the Royal Astronomical Society, 469, 594 (2017)
DOI: 10.1093/mnras/stx873

Proceedings

(27) A. Smith, R. Kannan, **E. Garaldi**
First results from the THESAN radiation-hydrodynamic simulations of the Epoch of Reionization
Bulletin of the American Astronomical Society, Vol. 54, No. 6
hyperlink: https://baas.aas.org/pub/2022n6i414p06/release/1

(28) Y.-C. Yeh, A. Smith, **E. Garaldi**, R. Kannan, M. Vogelsberger, R. Pakmor, V. Springel, L. Hernquist
The escape of ionizing photons in the THESAN simulations
Bulletin of the American Astronomical Society, Vol. 54, No. 6
hyperlink: https://baas.aas.org/pub/2022n6i126p04/release/1

(29) **E. Garaldi**, R. Kannan, A. Smith, V. Springel, R. Pakmor, M. Vogelsberger, L. Hernquist
Early structure formation in the THESAN radiation-magneto-hydrodynamics simulations
IAU Symposium 362
DOI: 10.1017/S1743921322001636

(30) **E. Garaldi**, M. Compostella, C. Porciani
Quasars at the Cosmic Dawn
IAU Symposium 333, 56–59 (2018)
DOI: 10.1017/S1743921317011310

Book chapters

(31) **E. Garaldi**
The THESAN *project: radiation magneto-hydrodynamic simulations of the epoch of reionization*
in 'High Performance Computing in science and engineering – Garching/Munich 2020' (2021)
editors: P. Bastian, D. Kranzlmüller, H. Brüchle, M. Brehm, and G. Mathias
ISBN: 978-3-9816675-4-7

Talks and seminars

Summary I am **regularly an invited speaker** (28 talks so far) in international conferences and research institutes. Among others, I was invited to deliver the **main colloquium** at Harvard's Center for Astrophysics and at the Edinburgh's Royal Observatory, the **opening review talk** at the 'Reionization in the Summer' 2023 conference and an **invited review** at 'Building galaxies from scratch' (in February 2024).

Invited Colloquia

(1) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*
Center for Astrophysics, Harvard, U.S.A, Sep. 2022

(2) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*
Royal Observatory Edinburgh, UK (virtual), Dec. 2021

(3) *Magnetogenesis around the first galaxies: the impact of different field seeding processes on galaxy formation*
University of Bologna, Italy (virtual), Oct. 2020

Invited reviews

(4) *Radiation-hydrodynamical simulations in the reionization epoch*,
Building galaxies from scratch, Vienna, Austria, Feb. 2024

(5) *Simulating Reionization and first galaxies: recent advancements and the road ahead*,
Reionization in the summer, Heidelberg, Germany, Jun. 2023

Invited talks

(6) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*,
Kapteyn Astrophysics Institute, Groningen, The Netherlands, Nov. 2023
(**as part of the interview for assistant professor, result pending**)

(7) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*,
CEA Astrophysics group, Paris, France, Apr. 2023
(**as part of the interview for permanent researcher position**)

(8) *Unveiling the connection between galaxies and reionization*,
Understanding the Epoch of Reionization, Sexten, Italy, Mar. 2023

(9) *Magnetic fields creation in reionization fronts*
Cosmic magnetism in voids and filaments, Bologna, Italy, Jan. 2023

(10) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection,*
Donostia International Physics Center, San Sebastian, Spain, Oct. 2022
(**as part of the interview for permanent researcher position**)

(11) *Magnetic fields creation in reionization fronts*
Cosmic magnetism in voids and filaments, Bologna, Italy, Jan. 2023

(12) *Magnetogenesis at cosmic dawn*
Center for Astrophysics, Harvard, U.S.A, Sep. 2022

(13) *The Thesan simulations of cosmic reionization*
Tsukuba University, Japan, Jul. 2022

(14) *The Thesan simulations of cosmic reionization*
ICRR, Tokyo, Japan, Jul. 2022

(15) *The Thesan simulations of cosmic reionization*
Tokyo University, Japan, Jul. 2022

(16) *The Thesan simulations of cosmic reionization*
Waseda University, Japan, Jul. 2022

(17) *The Thesan simulations of cosmic reionization*
Tsukuba University, Japan, Jul. 2022

(18) *The Thesan simulations of cosmic reionization*
Nagoya University, Japan, Jul. 2022

(19) *The Thesan simulations of cosmic reionization*
Osaka University, Japan, May 2022

(20) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*
IAS, Paris, France (virtual), Feb. 2022

(21) *A fierce new challenge: simultaneously understanding first galaxy formation, reionization and their connection*
DAWN Center, Copenhagen, Denmark (virtual), Jan. 2022

(22) *The Thesan simulation suite*
MPIA, Heidelberg, Germany, Oct. 2021

(23) *Investigating the connection between the first galaxies and their environment*
NYU, Abu Dhabi (virtual), Apr. 2021

(24) *Unveiling the connection between galaxies and IGM at high-z*
University of Heidelberg, Germany (virtual), Nov. 2020

(25) *Exploring the link between galaxies and IGM at high-z*
CfA, Harvard, USA (virtual), May 2020

(26) *The unforeseen IGM*
University of California, Santa Barbara, USA, Mar. 2018

(27) *A brief overview of the ZOMG project*
University of California, Santa Cruz, USA, Feb. 2018

(28) *Numerical structure formation from reionization to the local Universe*
Max-Planck Institute für Astrophysik, Garching, Germany, Jan. 2018

(29) *Quasar-only reionization: a numerical perspective*
Rome Observatory, Italy, Nov. 2017

(30) *The ZOMG project*
University of Bologna, Italy, Oct. 2017

(31) *Numerical investigations at high and low redshift*
Scuola Normale Superiore di Pisa, Italy, Oct. 2017

(32)   *Understanding assembly bias*
        SFB956 annual retreat, Schleiden, Germany, May 2017

Contributed

(33)   UniVersum IV,
        Trento, Italy, Feb. 2023

(34)   Reionization on a blackboard,
        Center for Computational Astrophysics, New York, Sept. 2022

(35)   IAUS362 – The predictive power of computational astrophysics
        online, Nov. 2021

(36)   LRZ results Workshop
        online, Jun. 2021

(37)   The Rise of Metals and Dust in Galaxies through Cosmic Time
        online, Oct. 2020

(38)   German Astronomy Society Meeting 2020 (2 talks)
        online, Jul. 2020

(39)   SAZERAC 2020 conference
        online, Jul. 2020

(40)   European Astronomy Society meeting 2020 (2 short talks)
        online, Jun. 2020

(41)   Bonn Gravity workshop 2019
        Bonn, Germany, Sep. 2019

(42)   What matter(s) between galaxies
        Spineto, Italy, Jun. 2019

(43)   Cosmology 2018
        Dubrovnik, Croatia, Oct. 2018

(44)   Intergalactic Interconnections
        Marseille, France, Jul. 2018

(45)   IAU Symposium 333 – Peering toward the Cosmic Dawn
        Dubrovnik, Croatia, Oct. 2017

(46)   Challenges in galaxy evolution
        Florence, Italy, Sep. 2017

(47)   Cosmic Reionization Workshop
        MIAPP, Garching, Germany, Apr. 2016

Selected schools and workshops

Hard skills

Nov 2023	(planned) Deep learning and GPU programming
	LRZ Supercomputing center, Germany
Aug 2023	Machine Learning in Astrophysics
	Heidelberg, Germany
May 2021	C++ intermediate programming
	Julich Supercomputing center, Germany
Nov. 2018	Data, lights, camera, action! Scientific visualization done beautifully
	SURFsara, Amsterdam, The Netherlands
Jun. 2018	4th School on Scientific Data Analytics and Deep Learning
	CINECA, Bologna, Italy

Feb. 2017	Machine Learning: the elegant way to extract information from data
	IMPRS Blackboard Lectures, Bonn, Germany
Oct. 2016	HPC methods for Computational Fluid Dynamics and Astrophysics
	CINECA, Bologna, Italy
Sep. 2016	Parallel programming workshop
	HLRS, Stuttgart, Germany

Soft-skills

Nov. 2021	Science communication and media training
	Max Planck Society Training Center
Oct. 2021	Effective proposal writing
	Max Planck Society Training Center
Sep. 2021	Write like a thought leader
	Max Planck Society Training Center
May 2021	Implicit Bias training
	Max Planck Society Training Center
Apr. 2021	Unconscious Bias in Academia
	Max Planck Society Training Center
Oct. 2016	Teaching techniques
	Bonn, Germany
Sep. 2016	Science integrity
	Köln, Germany

Outreach Talks

(1) *JWST: A new eye on the Universe*
Modena, Italy, Dec. 2021

(2) *Fundamental physics explained with pasta and baseball*
Pint of Science 2021, online, May. 2021

(3) *Codes & Qubit*
Modena, Italy, Apr. 2021

(4) *Black Hole Santa*
Modena, Italy, Dec. 2020

(5) *Cosmology and exoplanets*
Modena, Italy, Dec. 2019

(6) *Gravitational waves*
Modena, Italy, Dec. 2017

(7) *Symmetries in physics*
Popular scientific talk, Planetarium and high schools, Modena, Italy, Feb.–Jun. 2013

Other outreach activities

(8) Science consultant for National Geographic (article to appear in Oct. 2023)
U.S.A., 2023

(9) Part of the MPA team for 'Girls' day',
Munich, Germany, 2019, 2023

(10) Written and filmed two videos for science@home,
Munich, Germany, 2020 – 2021

(11) Scientist for SkypeAScientist,
Munich, Germany, Jan. 2019 – present

(12) Organizer of Pint of Science Munich,
Munich, Germany, Oct. 2018 – present

(13) Organizer of Astronomy on Tap Bonn,
Bonn, Germany, Jun.–Oct. 2018

(14) Scientific guide for *Higgs show*,
Modena, Italy, Sep. 2012

Memberships

2022–present	International Astronomical Union junior member
2017–present	European Astronomical Society
2015–2018	International Max Planck Research School (IMPRS) of Bonn and Cologne
2015–present	SFB956 consortium, sub-project C4
2012–present	Inco.Scienza Incontriamo la scienza (Italian outreach organization, based in Modena)

Academic references

The following three people have agreed to provide reference letters in support of my application.

Prof. Volker Springel

ADDRESS: Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Straße 1, Garching bei Müenchen
PHONE: +49 8930 0002 195
EMAIL: vspringel@mpa-garching.mpg.de

Prof. Cristiano Porciani

ADDRESS: Argelander-Institut für Astronomie, Bonn University, Auf dem Hügel 71, Bonn
PHONE: +49 228 733664
EMAIL: cporcian@uni-bonn.de

Dr. Benedetta Ciardi

ADDRESS: Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Straße 1, Garching bei Müenchen
PHONE: +49 8930 0002 018
EMAIL: bciardi@mpa-garching.mpg.de

Prof. Marco Baldi

ADDRESS: Dipartimento di Fisica e Astronomia, Bologna University, Via Piero Gobetti 93/2, Bologna
PHONE: +39 051 2095742
EMAIL: marco.baldi5@unibo.it

Prof. Mark Vogelsberger

ADDRESS: MIT Kavli Institute for Astrophysics and Space Research, 77 Massachusetts Avenue,
Cambridge, MA (U.S.) 02139
PHONE: +1 617-324-2415
EMAIL: mvogelsb@mit.edu

Prof. Piero Madau

ADDRESS: Dept. Astronomy & Astrophysics, 1156 High Street, Santa Cruz, CA (U.S.A.) 95064
PHONE: +1 831-459-3839
EMAIL: pmadau@ucolick.org

Supervision feedback

I consider crucial to ask for feedback from the students I supervise, in order to constantly improve my skills. I have asked the ones that I have supervised for the longest time to provide a write-up of their experience with me. Their names are:

- Benedetta Spina. Currently completing her PhD at the University of Bonn, and starting a postdoctoral position in Heidelberg in November 2023. I co-supervised her with Prof. Cristiano Porciani;
- Aniket Bhagwat. Currently a PhD student at the Max-Planck-Institut für Astropysik. I co-supervised him together with Dr. Benedetta Ciardi and Dr. Tiago Costa;
- Anshuman Acharya. Currently a PhD student at the Max-Planck-Institut für Astropysik. I co-supervised him together with Dr. Benedetta Ciardi;
- Silvia Fiaschi. She did part of her PhD at the Max-Planck-Institut für Astropysik. I co-supervised her with Dr. Benedetta Ciardi;
- Riccardo Zangarelli. He completed a MSc. at Bologna University, under the supervision of myself, Prof. Marco Baldi and Prof. Federico Marinacci. He recently obtained a PhD position at Bologna University.
- Verena Bellscheidt. She completed an internship at the Max-Planck-Institut für Astropysik, with me as sole supervisor. She is currently finishing her BSc.
- Marie Boussard. She completed an internship at the Max-Planck-Institut für Astropysik, with me as sole supervisor. She is currently finishing her MSc.

I attach their evaluations below (highlights mine).

February 25, 2022

To whom it may concern,

it is my great pleasure to write this statement regarding my collaboration with Dr. Enrico Garaldi.

I started working with Enrico in May 2021, during my second year of PhD, on a project about forecasts for SKA-1 MID detection of helium reionization. We then continued collaborating on a second project concerning the role of the environment in the star-formation-rate of dwarf galaxies during reionization. In both cases, by means of hydrodynamical simulations Enrico largely contributed to develop.

Enrico knowledge on these topics helped me pursuing my research goals and boosted my motivation into a deeper understanding of the physical processes involved. Most importantly, I feel affected by his curiosity towards our universe in such a way I desire both to answer the problems we are aware of and to find even more of them to be answered.

Not only Enrico showed a vast preparation on these regards, but he has always been very clear when explaining it: I can not count the number of times I needed help or clarification with both his simulations and the models we considered and he was able to solve my doubts in the most simple way possible. Enrico has never diminished my ideas and my questions, on the contrary he always make me feel my work considered and appreciated.

Our meetings are very productive and I have never encountered problems into arranging them. Moreover, he is easily reachable and he always replies within a few hours at maximum.

I feel drowned by Enrico's motivation and I greatly appreciate his expertise and understanding of many astrophysical problems. I am grateful I had the amazing opportunity to work with Enrico and I truly hope our collaboration will be even closer in the future.

Sincerely,

Benedetta Spina

To whom it may concern,

I'm honoured to be writing an evaluation of co-supervision for Dr. Enrico Garaldi. I have had the pleasure of being a colleague of and interacting with Enrico since 2018. The time period since covers my growth as an inexperienced young researcher, Enrico has been a very important part of this growth.

Between 2018-2019 I was at the Max Planck Institute for Astrophysics as an internship student. During this time, I did not work directly in collaboration with Enrico but he encouraged active discussions via paper discussion sessions or even over a cup of coffee. As a young inexperienced student, these discussions were invaluable as I could tap into Enrico's insights and experience working on the high redshift universe and learn from it.

I joined the Max Planck Institute for Astrophysics as a PhD student in 2020, since joining, I have been closely collaborating with Enrico on two very different projects. The diverse nature of Enrico's scientific interests and his experience with running large scale numerical simulation projects have enabled me to quite confidently take on with both numerical and theory oriented projects knowing there is someone in-house who has the expertise to help and guide me through these projects. Enrico's motto for his supervision is "my office doors are always open", as a young researcher this is very comforting and I take full advantage of this. Enrico is always happy to have long extended discussions, answer my questions and share resources.

Despite being his student, Enrico always treats me as an equal colleague to him. One key aspect that is very motivating is that Enrico is very open and responsive to ideas that I bring up while being a healthy level of truthful of how feasible certain ideas are in terms of execution, I personally feel this is invaluable. Enrico has indeed played a key role in my growth and development as a young researcher. Away from the scientific point of view, every young researcher has roadblocks when they feel stuck, demotivated and affected by imposter syndrome. I have had moments like these along the way and Enrico has helped me overcome these by discussing the problems, reassuring me and finding ways to fix the issues. Instilling positivity and enthusiasm is a key skill Enrico has which has helped me through my PhD outside of the scientific side of things.

In summary, I am grateful that I have Dr. Enrico Garaldi as a guide and a co-supervisor through the course of my PhD. He not only manages to share his knowledge and insights with me to carry on my own research, he has also helped my overall growth. His zest and enthusiasm towards learning the high redshift universe motivate me and make me a better student.

Sincerely,

Aniket Bhagwat
2nd Year PhD Student
Max Planck Institute for Astrophysics

October 2, 2023

To Whom it May Concern:

It is a great pleasure to enthusiastically support my collaborator and mentor Dr. Enrico Garaldi by writing this letter.

I have interacted with Enrico since the beginning of my PhD in September 2021 and began working with him directly on a project in October 2022. In this project, we used the radiative-hydrodynamical simulations `THESAN` (Enrico being a co-PI of the `THESAN` project) setup to explore the suppression of cosmic variance on using the Fixed and Paired approach put forward by Pontzen et al. (2016) in modelling the reionization-era 21-cm signal.

Having previously only worked with simulation data but not having run simulations myself, this was a project where I heavily relied on the guidance and mentoring of Enrico. We started right from the basics of the `AREPO`-based framework and how the different components worked, up to the point of understanding the capabilities as well as the limitations of the `THESAN` simulations. Enrico also ensured that I developed a keen understanding of the physical implications of the simulations, and the results we obtained. Further, we carefully analysed the Fixed and Paired approach to understand its assumptions and read through papers that used the technique for other applications. The clarity and patience with which Enrico addressed my queries and doubts was exceptional. In the project, there were times when things did not work, but Enrico's enthusiasm ensured that I continued to be motivated. Suffice it to say, this has led to the project leading to fascinating results, as well as adding significantly to my knowledge and experience. Working with Enrico encouraged me to delve deeper into developing and running cosmological simulations for Reionization-era studies, and I have begun working on my own simulation setup based on the things I have learned from him.

One of the key aspects that I liked about Enrico's method of supervision was his two-pronged approach. That is, he focused on the following:

1. **Scaling by my background knowledge:** A key thing he does is to check how much I know about a specific topic so that he can adapt his explanation to best fit my needs. This is incredibly important and shows his clarity of concepts and teaching skills.

2. **Providing constructive criticism:** While pointing out flaws and issues is fairly trivial, it requires a significant amount of effort to suggest methods on how to improve on them. As a PhD student, I found this immensely helpful, especially when it came to writing the paper on the results of our project.

At no point of the project did I feel lost during the project, as Enrico was always approachable, through in-person meetings or emails/messaging. Thus, I believe my PhD experience was enriched by my opportunity to work with Enrico, and I hope to be able to collaborate with him in future projects too.

Sincerely,
Anshuman Acharya

Dear hiring committee,

It is my pleasure to write an evaluation of Dr. Enrico Garaldi for your assistant professor vacancy. As a PhD Student at Max Planck Institute of Astrophysics from 2019 to 2021, I got the chance to work in the same group of Enrico.

Responsible and particularly bright, Enrico was among the Post Docs who co-supervised my project , and I absolutely endorse his qualification and his skill set. During my time at Max Planck, we have collaborated and discussed about my project, a study of the impact of binary systems on the Epoch of Reionization. Being inquisitive and intuitive by nature, he played a role of huge importance since he has always been able to answer my questions giving me new insights on fine physical interpretations. He expertly assisted me and gave truly special advices about general experiences across the academic spectrum, serving his extensive knowledge also to motivate junior peers.

I have also witnessed the exceptional contributions that Enrico has made to the Max Planck community. Not only is he an excellent researcher, but he would engage his peers and juniors in lively scientific discussions during group and Institute meetings. He is dedicated to the concept of education indeed, and has an amazing sense of restraint and balance that allows this to work in his favor.

Enrico has my enthusiastic recommendation. He is a smart and strong person who has a clear sense of direction and purpose. I am confident that he will bring the same support, insight, and commitment to your institution.

Please do not hesitate to contact me for any further information.

Thanks, and best regards,

Silvia Fiaschi

To whom it may concern,

I am very pleased to write about the experience which I had with Dr. Enrico Garaldi as my M.Sc. thesis co-supervisor. In fact, the core idea of the thesis itself derives from a paper in which he is first author; therefore, his help was crucial for the good result of my work. Since I first started my thesis project in May 2022, Enrico has always been ready to promptly answer my many doubts and concerns. Even in the limited timeframe in which I have worked with him, I was able to realize that Enrico's experience in the topic of cosmological simulations was invaluable, not only because he provided the core framework for my thesis, but also because of the many ideas and remarks that he proposed along the way. In fact, he also provided a vast amount of practical resources, ranging from full N-body codes to access to computing clusters. In the latter case, Enrico also offered to explain to me thoroughly and in full detail how to operate these clusters, saving me the trouble of searching those informations myself.

As for the proofreading of my dissertation, Enrico's comments were mostly precise and on point, and he also often provided full-on sentences to integrate the text with. Moreover, he was always willing to further discuss any comments and remarks that were unclear to me, patiently answering every single question in my extremely long and frequent emails.

I would also like to mention that Enrico's helping hand did not stop there. During my thesis project, I had moments where unexpected issues and results made me lose motivation and confidence; during these moments, Enrico provided moral support on top of the practical advice to address the issues, and remarked that I should be proud of my work when I felt underwhelmed by results that I deemed sub-optimal at first glance.

In summary, I value my experience with Enrico as my co-supervisor as an extremely positive one, and I hope to work again with him in the future, as I firmly believe that collaborating with people like Enrico will make me a better researcher just as it made me a better student.

Sincerely,

Riccardo Zangarelli
Master's degree student in Astrophysics and Cosmology
University of Bologna

October 20, 2022

To whom it may concern,

From 22 August 2022 to 14 October 2022, at the end of the first year of my undergraduate studies in physics, I completed an internship at the Max Planck Institute for Astrophysics under the supervision of Dr. Enrico Garaldi.

During the internship, Enrico taught me about the epoch of reionization and about a radiation-magneto-hydrodynamical simulation of this epoch, among other things. He greatly helped me develop both general and specific skills essential to a career in research.

Throughout my internship, he was available to answer my questions at any point and took his time to thoroughly explain everything I needed for my project, and more. I am especially impressed with his ability to explain physical and computational concepts in such a comprehensive ways that even someone who is just starting out on the field has no trouble understanding them. While his explanations never required more prior knowledge that could reasonable be expected, they nevertheless explained the concepts at hand in such detail that I had no problems applying them to my project.

Enrico is a very approachable person and I had absolutely no trouble reaching out to him when I had any concerns. I always looked forward to our meetings, which were both inspiring and insightful. I sincerely enjoyed working with him and would very much appreciate the opportunity to do so again in the future.

Sincerely,

Verena Bellscheidt

Grenoble, 30/08/2023

To whom it may concern,

From 17 April 2023 to 25 August 2023, I did an internship at the Max Planck Institute for Astrophysics supervised by Dr. Enrico Garaldi, on the topic of numerical simulations of galaxy formation during the reionization.

Enrico was a very involved supervisor, being very available when I needed help for a coding problem or a physical interpretation. His explanations were always very clear and made even complex phenomena easy to understand. Thanks to him, I learned many interesting things about computational methods in astrophysics and the epoch of reionization.

Besides, working with Enrico was a pleasure as he was very nice and patient. He was also very attentive to my scientific interests, for example by asking to know which points I wanted to deepen the most. Moreover, he gave me valuable advice about working on numerical simulations in astrophysics as well as on a career in research in general, and helped me greatly to develop my scientific skills.

To sum up, working with Enrico was very interesting and enriching, and if the opportunity arose I would be very happy to do it again.

Yours sincerely,

Marie Boussard