

Curriculum Vitae

RESEARCH INTERESTS & METHODS

Numerical Galaxy Formation and Numerical Cosmology
Halo gas, Feedback, Clusters of Galaxies and Large-Scale Structure
Galaxy Evolution, including Milky Way's Structure and Assembly
21 cm, Dark Matter and Dark Energy Cosmology
Primordial Fluctuations, Inflation, and Primordial non-Gaussianity

Gravity + Magneto-Hydrodynamics Cosmological Numerical Simulations of Galaxies
Statistical Analysis of synthetic Datasets; forward modeling of simulated data
Cosmological-parameter inference and Analytical Cosmological Perturbation Theory

EDUCATION

- 2010 **Ph.D. in Physics: ETH Zürich, Switzerland**
Advisors: Prof. C. Porciani and Prof. S. Lilly;
Thesis Title: *"Constraining Primordial Non-Gaussianity from the Large Scale Structure of the Universe"*
- 2005 **Master in Physics, 110/110: Università degli Studi di Pisa, IT**
Advisor: Prof. S. Matarrese; Thesis Title: *"Cosmological Perturbation Theory in a Matter Dominated Universe: the Gradient Expansion"*
- 2003 **Bachelor in Physics, 110/110 cum Laude: Università degli Studi di Pisa, IT**
Supervisor: Prof. E. Vicari, Final Work Title: *"Cosmological Models"*

PROFESSIONAL APPOINTMENTS

- Sept 2020 - now **Max Planck Institute for Astronomy, Heidelberg**
Permanent Staff Member and Research Group Leader
- June 2016 - August 2020 **Max Planck Institute for Astronomy, Heidelberg**
W2 Independent Research Group Leader
- Nov 2013 - May 2016 Center for Astrophysics, **Harvard University**
Post-doctoral researcher
- Nov 2010 - Oct 2013 **University of California at Santa Cruz, USA**
Swiss National Science Foundation Post-doctoral Fellow
UCSC Post-doctoral Scholar
- June 2010 - July 2010 **CEA Saclay, France**
Short term Post-doctoral Scholar at Inst. of Theoretical Physics
- Nov 2005 - May 2010 **ETH Zürich, Switzerland**
Research and Teaching Assistant

SOC CHAIR AND PRIMARY ORGANIZER OF INTERNATIONAL SCIENTIFIC MEETINGS

- 2019 [Ringberg Workshop "Machine learning tools for research in astronomy"](#), ~ 60 participants
2018 [MPIA Conference "Stellar Halos across the Cosmos"](#), ~100 participants
2017 [Ringberg Workshop "Galaxy evolution in groups and clusters"](#), ~ 60 participants
+ SOC member of other 9 scientific conferences

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RESEARCH GRANTS, AWARDS, AND HONORS (HIGHLIGHTS)

- 2022 **TNG-Cluster:** extending IllustrisTNG to the most massive objects in the Universe”
Steinbuch Centre for Computing at KIT: Computing proposal
Co-PI and principal author
64 million core hours allocated on HoreKA at KIT (value: approx. €2,400,000)
- 2021 **“EXPLORATORY PROJECT EP 3.4, EXC 2181 STRUCTURES”**
“From the fine-structure features of stellar haloes to the histories of their galaxies”
PI and author: about €45,000 for a 1-year PhD salary
- 2019 **“HLRS Golden Spike Award”**
Awarded by the High-Performance Computing Center Stuttgart (HLRS)
- 2019-2022 **“SFB881 The Milky Way System”**
DFG Heidelberg-wide Collaborative Research Centre: Third funding period
Co-PI and author: about €501,000 for a PhD and postdoctoral position
- 2019-2025 **“EXC 2181 STRUCTURES”**
Heidelberg-wide Cluster of Excellence
Associate member (CP1: Cosmic Structure Formation): funds for a postdoctoral position
- 2017-2018 **“IllustrisTNG-Dwarf: Predictive galaxy formation from the smallest to the largest scales”**
Gauss Center for Supercomputing: Computing Proposal Extensions / 44101 / GCS-Dwar
Co-PI and principal author
30+25 million core hours allocated on HazelHen at HLRS (value: approx. €2,100,000)
- 2016 **“IllustrisTNG-Dwarf: Predictive galaxy formation from the smallest to the largest scales”**
Gauss Center for Supercomputing: Computing Proposal / 44101 / GCS-Dwar
Co-PI and principal author
84 million core hours allocated on HazelHen at HLRS (value: approx. €3,155,000)
- 2016 **“The Illustris++ Project: Predicting galaxy formation in a representative volume...”**
Gauss Center for Supercomputing: Computing Project Extension / 44057 / GCS-ILLU
Co-I and principal author
19.5 million core hours allocated on Hazel Hen at HLRS (value: approx. €730,000)
- 2014 **“IllustrisTNG:The Next Generation Cosmological Hydrodynamics Simulations”**
XSEDE Computing Proposal: TG-AST140063
PI and principal author
5 million core hours allocated on TACC/Stampede (value: approx. USD173,000)
- 2014 **“Clusters of Galaxies in the last 5 Billion Years: from the Brightest Cluster Galaxy to the Intra-Cluster Light”**
HST, Cycle 22, Theory Proposal: AR-13897
PI and principal author: USD100,251
- 2010 **Swiss National Science Foundation Fellowship for Prospective Researcher**
- 2000 - 2005 **Undergraduate Fellowship “Fondazione Collegio Puteano”, Pisa, Italy**

LEADERSHIP AND PROFESSIONAL SERVICES

- 2022 — 2024 Member of the [ADS User Group](#)
- 2016 — Reviewer for Supercomputing Time Allocations:
DiRAC High Performance Computing resource (UK)
Leibniz-Rechenzentrum (SuperMUC; Germany)
- 2012 — Reviewer for peer-review journals:
MNRAS, APJ, JCAP, ASCOM, Universe, A&A, Science, Nature Astronomy
- 2009 — Reviewer for funding agencies and Review panel member (alphabetical order):
Austrian Science Fund (FWF, Austria)
Dutch Research Council (NWO, The Netherlands)

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European Research Council, ERC Advanced Grants (EU)
Hubble Space Telescope, Cycle 21 (HST; USA)
Humboldt Foundation (Germany)
Israel Science Foundation (Israel)
NASA Hubble Fellowship Program (NHFP; USA)
National Fund for Scientific and Technological Development (Fondecyt, Chile)
National Commission for Scientific and Technological Research (ALMA-CONICYT, Chile)
Natural Sciences and Engineering Research Council of Canada (NSERC; Canada)
National Science Foundation (NSF; USA)

INVITED RESEARCH COLLOQUIA AND SEMINARS AT SCIENTIFIC INSTITUTES

> 40 invited colloquia and seminars at institutes in North/South America, Europe, Australia

- 2022 Colloquium, University of Warwick, Dept. Of Physics, UK (virtual)
Colloquium at Symposium in Computational Physics May 2022, Heidelberg, D
Institute seminar at ICRAAR, Perth, Australia
Colloquium, University of Vienna, Dept. Of Astronomy, Austria (virtual)
Colloquium, Universita' La Sapienza, Rome, Italy (virtual)
- 2021 OSU Colloquium, Ohio State University, USA (virtual)
Seminar at the IAC Tenerife, Spain (virtual)
Seminar at Universidade Cruzeiro do Sul, Sao Paulo, Brazil (virtual)
IAP Colloquium, Paris, France (virtual)
- 2020 Seminar at University of Victoria, Canada (virtual)
Colloquium at ICRAR/University of Western Australia, Australia (virtual)
Colloquium at CU Boulder, USA (virtual)
ITC Colloquium at Harvard University, USA (virtual)
Astronomy Colloquium at University of Sussex, UK
- 2019 Public Colloquium at Reykjavik University, Iceland
Colloquium at IRAP Toulouse, France
Seminar at Liverpool University, UK
Seminar at MPE, Germany
Colloquium at ASIAA, Taipei, Taiwan
- 2018 Seminar at the Institute for Astronomy, Tenerife, Spain
Joint Astronomy Colloquium at Garching, Germany
Colloquium at Durham, UK
Colloquium at UC Santa Cruz, USA
Cosmology Seminar at Stanford University, USA
Colloquium at ETH Zurich, Switzerland
Seminar at the 73rd Netherlands Astronomers Conference, Netherlands
Colloquium at INAF Osservatorio Astronomico di Trieste, Italia
- 2017 Colloquium at Universite' de Montpellier, France
Colloquium at St. Andrews University, UK
Colloquium at the Universitäts-Sternwarte München, Germany
Heidelberg Joint Astronomical Colloquium, Germany
Colloquium at the CCA Simons Foundation, New York, USA
Keynote Seminar at the 22nd Symposium for Astroparticle Physics, Netherlands
- 2016 Koenigstul Colloquium, Heidelberg, Germany
- 2015 Lunch Seminar, Tufts University, USA
Brown Bag Talk, Harvard University, USA
- 2014 Cosmology Seminar at the Univ. of Minnesota, Minneapolis, USA
- 2013 Colloquium at IPMU, Kashiwa, Japan
Seminar at the "CITA Seminar Series", Toronto, Canada
- 2012 Colloquium at UW Astronomy Department, Seattle, USA
- 2010 Colloquium at MPE, Garching, Germany
Colloquium at the Institut de Physique Theorique, CEA, France
- 2008 Colloquium at the Lab. de Phys. Subatomique et Cosmologie, Grenoble, France

+ tens of other self-initiated seminars and scientific presentations seminars, also at local institutions

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INVITED TALKS AT INTERNATIONAL CONFERENCES, MEETINGS AND SCHOOLS (>55 INVITED TALKS)

- 2022
"What is the Milky Way telling us about galaxy formation", Perth, Australia
"What matter(s) around galaxies 2022", Champoluc, Italy
"6th ICM Theory and Computation Workshop", Copenhagen, Denmark
Plenary on "Resolving the Rise and Fall of Star Formation in Galaxies", IAU2022, Korea
"The Physical Properties of Groups of Galaxies", Bertinoro, Italy
"Properties and impact of large-scale multiphase AGN outflows", EAS2022, Valencia (ES)
"SynCRETism 2022 - Particle physicists dining with Astrophysicists", Crete, Greece
"Special session on Line Emission Mapper", 240th AAS meeting, Pasadena, USA (virtual)
"LEGA-C" meeting, Bruges, Belgium
"Galaxy Clusters 2022: Challenging Our Cosmological Perspectives", STScI, USA (virtual)
"Ringberg Workshop on Computational Galaxy Formation", Germany
"Dawn Winter School", Copenhagen, Denmark (virtual)
- 2021
"Dark World to SwampLand" Workshop, Korea/Spain (virtual)
"Predictive Power of Computational Astrophysics", IAU362, Chamonix, France (virtual)
"ML4Jets" i.e. ML for particle physics, Heidelberg, Germany (virtual)
"XXXII IUPAP Conference on Computational Physics", Coventry, UK (virtual)
"Gamma rays to shed light on dark matter", ISAPP School, Spain (virtual)
"Fundamentals of Gaseous Halos", KITP, Santa Barbara, USA (virtual)
- 2020
"Linking the Galactic and Extragalactic", Wollongong, Australia (virtual)
"Virgo Consortium Meeting", Durham, UK
- 2019
"Subaru Telescope 20th anniversary Conference", Hawaii, USA
"Fornax3D Collaboration Meeting", Heidelberg, DE
"22th Results and Review Workshop of the HLRS", Stuttgart, DE
"Extremely big eyes on the Early Universe", Rome, IT
"Tracing cosmic evolution with clusters of galaxies", Sexten, IT
"Stars without borders", Ljubljana, Slovenia
"Light in the suburbs: structure and chemodynamics of galaxy halos", Sexten, IT
"News from the Dark", Montpellier, France
"Metals in galaxies, near and far", Leiden, Netherlands
"Physics of the Intracluster Medium: Theory and Computation", Budapest, HU
"Panchromatic Panoramic Studies of Galaxy Clusters", Taipei, Taiwan
"Linking galaxies from the epoch of initial star formation to today", Sydney
- 2018
"Virgo Consortium Meeting", Leiden, Netherlands
"Cosmology in Dubrovnik 2018", Dubrovnik, Croatia
"Birth, life and fate of massive galaxies...", Favignana, Italy
"The Physics of Galaxy Scaling Relations", Kingston, Canada
"eROSITA Consortium meeting", Garching, Germany
"Mock Durham: Galaxy Formation for Surveys", Durham, UK
"EWASS: Unveiling the low surface brightness Universe", Liverpool, UK
"Computational galaxy formation", Ringberg, Germany
"SnowCluster 2018", Salt Lake City, USA
"ASPECS team meeting", Ringberg, Germany
- Before 2017
"Carving through the Codes: Challenges in Computational...", Davos, CH
"Baryonic Stellar Haloes", Galapagos, Ecuador
"The Galaxy Ecosystem", ESO, Garching, Germany
"A Decade of the Star-Forming Main Sequence", Leiden, Netherlands
"Fornax Deep Survey Meeting", Groningen, Netherlands
"Dwarf Galaxy Workshop", ESO Garching, Germany
"Computational galaxy formation", Ringberg, Germany
"eROSITA and followup", Ringberg, Germany
"Cosmology with Galaxy Clusters in the XXI Century", Madrid, Spain
"Arepofest-1", Heidelberg, Germany
"The almost-Gaussian Universe", CEA, France

+ tens of contributed seminars at other international and collaboration meetings.

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MAIN SCIENTIFIC COLLABORATIONS

2022 — Line Emission Mapper (LEM) Science Team (PI: Ralph Kraft)
2019 — EXC 2181 STRUCTURES (associate member, “Cosmic Structure Formation”)
2016-2024 Collaborative Research Center SFB881 “The Milky Way System” (co-I)
2014 — IllustrisTNG Collaboration (co-PI) - <https://www.tng-project.org/>
2012 — eROSITA German Consortium (external collaborator)

TEACHING ACTIVITY

2019 — **Heidelberg University, Block Course (SS22, SS21, SS20, SS19)**
For Master and PhD students: “**Cosmology**”

2020 **Heidelberg University, Master Seminar (WS20/21)**
For Master students: “**Observational and Numerical Elements of Galaxy Evolution**”

2019 **Heidelberg University, Master Seminar (WS19/20)**
For Master students: “**Numerical Galaxy Formation**”

2018 **Heidelberg University, 41st Heidelberg Physics Graduate Days**
For Master and PhD students: “**Simulations for galaxy formation and evolution**”

2005-2010 **ETH Zürich, Teaching Assistant for undergraduate-level courses:**

- 2 semesters in Electromagnetism (frontal class)
- 1 semester in Introduction to Quantum Mechanics (frontal class)
- 1 semester in Astrophysics (exercise responsible)
- 3 semesters in Advanced Physics Laboratory Courses

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

2016— Official and day-to-day supervisor of
9 Postdocs, 5 PhD students, 6 master students; 3 bachelor students

2014-2016 Research mentor and primary collaborator of 5 PhD students at Harvard University

OUTREACH

2022 Vortrag at “[Die lange Nacht der Astronominnen](#)”, Garching b. München
2021 “[Cosmological Jellyfish](#)”, citizen science project, on Zooniverse.org
2020 “[Universi al Computer](#)”, article for the astronomy magazine Coelum
2018 “[Abbiamo messo l’Universo in una scatola](#)”, article for La Lettura - Corriere della Sera

SCIENTIFIC PUBLICATION METRICS

(see attached Publication List, if applicable — [source ADS](#), as of ~11/2022)

Total of 161 refereed publications in peer-review journals,
Of which 11, 35, and 19 as 1st, 2nd and 3rd author, respectively

Total of ~14500 citations, of which > 2900 from first-author papers
h-index = 59

first-author papers with > 100 citations = 7

first-author papers with > 300 citations = 3

ACADEMIC SUPERVISORS AND MENTORS

- Prof. Lars Hernquist, Harvard University, Cambridge, USA
- Prof. Volker Springel, Max Planck Institute for Astrophysics, Munich, Germany
- Prof. Piero Madau, University of California Santa Cruz, USA
- Prof. Cristiano Porciani (PhD advisor), University of Bonn, Germany
- Prof. Hans-Walter Rix, Max Planck Institute for Astronomy, Heidelberg, Germany