Garching bei München

Max-Planck-Institut für Astrophysik

Karl-Schwarzschild-Straße 1, Postfach 1317, 85741 Garching,
Tel.: (0 89) 30000–0, Telefax: (0 89) 30000-2235
e-Mail: userid@mpa-garching.mpg.de

0 Allgemeines

Das Max Planck Institut für Astrophysik ging hervor aus der gleichnamigen Abteilung am Göttinger MPI für Physik. Mit dem Umzug nach München im Jahre 1958 wurde dieses erweitert zum MPI für Physik und Astrophysik mit Heisenberg und Biermann als Direktoren. Die Arbeiten zur theoretischen Astrophysik lieferten grundlegende Erkenntnisse zur Sonnenphysik, Plasmaphysik und Sternstruktur. 1963 wurde als neues Teilinstitut das Institut für extraterrestrische Physik gegründet. 1991 erfolgte die Aufteilung in drei eigenständige Max-Planck-Institute, das MPI für Physik (MPP), das MPI für Astrophysik (MPA) und das MPI für extraterrestrische Physik (MPE). 2008 feierte das MPA sein 50-jähriges Jubiläum. Im Herbst 2009 bekam das MPA die Genehmigung für einen Erweiterungsbau. Ziel war es, in dem neuen Gebäude einen größeren Hörsaal (120 Sitze), die Computer Gruppe, sowie die Verwaltung (MPE/MPA) unterzubringen. Die Räumlichkeiten im Altbau werden von den MPA Wissenschaftler/innen genutzt. Im Sommer 2013 waren alle Umzüge in den Anbau abgeschlossen. Seit Juni 2014 ist das neu renovierte Gästehaus wieder eröffnet worden und wird auch sehr intensiv von MPA und MPE Gästen genutzt. Zugehörig zum Gästehaus wurde 2015 noch ein Gemeinschaftsraum mit Küche fertiggestellt. Auch ein kleines Teleskop auf dem Dach des Instituts wurde installiert. Die wissenschaftliche Ausrichtung des MPA hat ihren Schwerpunkt in theoretischen Studien, allerdings beteiligt sich das Institut auch immer wieder an größeren Beobachtungsprogrammen, unter anderem betreibt es auch eine Station des LOFAR Radioteleskops. Aktuell wird das Institut von vier Direktoren geleitet, in den Bereichen Physikalische Kosmologie (Komatsu), Galaxienentwicklung (Kauffmann), Stellare Astrophysik (de Mink) und Numerische Astrophysik (Springel).

1 Personal und Ausstattung

1.1 Personalstand

Direktoren und Professoren: 4

Prof. Dr. Selma de Mink [2020-], Prof. Dr. Guinevere Kauffmann [2013-], Prof. Dr. Eiichiro Komatsu [2012-](Geschäftsführender Direktor seit 1.1.23), Prof. Dr. Volker Springel [2018-]

ForschungsgruppenleiterInnen/W2 Mitarbeiter: 15

Dr. Fabrizio Arrigoni-Battaia, Dr. Eugene Churazov, Dr. Benedetta Ciardi, Dr. Torsten Enßlin, Dr. Marat Gilfanov, Dr. Max Grönke, Dr. Hans-Thomas Janka, Dr. Stephen Justham, Dr. Thorsten Naab, Dr. Rüdiger Pakmor, Dr. Fabian Schmidt, Dr. Mahdieh Schmidt (wissenschaftliche Koordination), Dr. Sherry Suyu (Max Planck Fellow sowie Associate Professor an der Technischen Universität München (TUM)), Dr. Simona Vegetti, Prof. Dr. Achim Weiss.

Wissenschaftliche Mitarbeiter: 52

Dr. Tiara Battich, Dr. Eirini Batziou (seit 01.10.2023), Dr. Earl Bellinger (bis 31.08.2023), Dr. Linda Blot (bis 30.09.2023), Dr. Deepika Bollimpalli (bis 30.09.2023), Dr. Jan Burger, Dr. Paolo Campeti (bis 31.10.2023), Dr. Raoul Cañameras (bis 16.06.2023), Dr. Seok-Jun Chang, Dr. Martyna Chruslinska, Dr. Tiago Costa (bis 30.09.2023), Dr. Sten Delos (bis 14.09.2023), Dr. Patricia Diego Palazuelos (seit 01.10.2023), Dr. Ryan Farber (bis 31.10.2023), Dr. Robert Farmer (bis 31.08.2023), Dr. Konstantina Maria Fotopoulou (bis (bis 30.04.2023), Dr. Philipp Frank, Dr. Daniela Galarraga-Espinosa, Dr. Enrico Garaldi, Dr. Anna Genina, Dr. Robert Glas, Dr. Cesar Hernandez-Aguayo, Dr. Andrew Jamieson, Dr. Cole johnston (seit 01.11.2023), Dr. Laura Herold (bis 15.10.2023), Dr. Simon Huber, Dr. Liliya Imasheva (bis 31.07.2023), Dr. Valeriya Korol, Dr. Andrija Kostic (bis 31.10.2023), Dr. Alexandra Kozyreva (bis 28.02.2023), Dr. Ivan Kostyuk (seit 01.06.2023), Dr. Daniel Kresse (bis 31.12.2024), Dr. Toshiki Kurita (seit 01.10.2023), Dr. Natalia Lahen, Dr. Qi Li, Dr. Luisa Lucie-Smith, Dr. Alejandra Melo Melo, Dr. Iker Millan Irigoyen, Dr. Aleksandra Olejak (seit 01.10.2023), Dr. Conor O'Riordan, Dr. Bo Peng (seit 01.10.2023), Dr. Devon Powell, Dr. Holly Preece (bis 30.09.2023), Dr. Antti Rantala, Dr. Martin Reinecke, Dr. Taeho Ryu, Dr. Adam Schaefer (bis 30.09.2023), Dr. Matthew Smith (seit 01.10.2023), Dr. Hannah Stacey (bis 31.08.2023), Dr. Jakob Stegmann (seit 01.09.2023), Dr. Rosemary Talbot, Dr. Stefan Taubenberger, Dr. Alejandro Vigna-Gomez, Dr. Christian Vogl, Dr. Chen Wang, Dr. Maria Werhahn, Dr. Oliver Zier (bis 30.09.2023)

Doktoranden: 63

Anshuman Acharya, Silvia Almada Monter, Shaghaiehj Azyzy (seit 01.10.2023), Ivana Babic, Arghyadeep Basu, Monica Barrera, Eirini Batziou (bis 31.07.2023), Aniket Bhagwat, Teresa Braun, Vittoria Brugaletta (bis 31.12.2023), Sergei Bykov, Benedetta Casavecchia, Safak Celik (seit 01.07.2023), Miha Cernetic, Geza Csoernyei, Hitesh Kishore Das, Vincent Eberle, Gordian Edenhofer, Sebastian Ertl, Jakob Ehring, Fulvio Ferlito, Konstantina Maria Fotopoulou (bis 31.12.2022), Vale Gonzalez Lobos, Alexandra Grudskaia, Jana Grupa, Matteo Guardiani, Johannes Harth-Kitzerow (bis 31.12.2023), Jakob Hein, Malte Heinlein, Laura Herold (bis 31.05.2023), Eileen Herwig, Gaoxiang Jin, Gaoxiang Jin (seit 01.09.2022), Vishal Johnson (seit 17.04.2023), Andrija Kostic (bis 31.07.2023), Ivan Kostyuk (bis 31.05.2024), Daniel Kresse (bis 30.06.2023), Jing-Ze Ma, Alexander Mayer, Marta Monelli, Marija Minzburg, Jeongin Moon (seit 01.04.2023), Nahir Munoz Elgueta (bis 30.09.2023), Vyoma Muralidhara, Simon Ndiritu (bis 31.10.2023), Ivana Nikolac (seit 04.09.2023), Christian Partmann, Shubham Raghuvanshi (seit 05.06.2023), Abinaya Swaruba Rajamuthukumar, Katlego Ramalatswa, Bryce Remple, Johannes Maximilian Ringler, Jakob Roth, Julian Rustig (bis 28.02.2023), Maryam Tajalli (seit 31.01.2026), Lazaros Souvaitzis, Joanne Tan, Beatriz Tucci-Schiewaldt, Ruggero Valli, Akash Vani (seit 01.09.2023), Pavan Vynantheya, Han Wang, Margret Westerkamp, Hanieh Zandinejad

Masterstudenten: 26

Anisha Anisha , Mohammadreza Ashari, Nikolis Charalampos, Manik Dawar, Alina Fantauzzi, Sebastian Gil Rodriguez, Sylvia Hofs, Mrinal Jetti, Elias Mamuzic, Tapan Mayukh, Anton Noebauer, Martin Reiss, Jakob Roth, Igor Rzhin, Iason Saganas, Moritz Singhartinger, Philipp Straub, Kristian Tchiorny, Qiang Wang, Andreas Popp, Manik Dawar, Satadru Bag, Fabian Sigler, Benedikt Seidl, Martin Reiss, Mohammadmahdi Movahedi-Najafabadi.

Sekretariat und Verwaltung: 6

Sonja Gründl, Maria Depner (bis 30.04.2023), Gabriele Kratschmann, Cornelia Rickl (bis 31.01.2023), Isabel Thapa, Marina Pantze (bis 31.08.2023)

Verwaltungsleitung: Pia Fischhaber

Technische Mitarbeiter: 9

Computational Support: Heinz-Ado Arnolds (IT management), Andreas Breitfeld, Goran Toth, Andreas Weiss, Gerhardt Werner Grek (seit 30.09.2023)
Library: Mirna Balicevic, Christiane Bartels (library management), Elisabeth Blank.
Public relation: Dr. Hannelore Hämmerle (MPA und MPE)

Gäste: 65

Marcelo Miller-Bertolami (National University of La Plata, Argentina) 22.04–09.05, Andrea Chiavassa (Observatoire de la Côte d'Azur, France) 17.04–12.05, Silvia Bonoli (Donostia International Physics Center, Spain) [2-month visit, split between May and July, Humboldt], Antonela Monachesi and Facundo Gomez (University of La Serena, Chile) 25.06–15.07, George Efstathiou (University of Cambridge, UK) 03.07–21.07, Saleem Zaroubi (University of Groningen, Netherlands) [6-month visit in September, Humboldt], Isabel Baraffe (University of Exeter, UK) 20.11–15.12, Giles Chabrier (Ecole Normale Supérieure de Lyon, France) 20.11–15.12, Paul Ricker (sabbatical, University of Illinois Urbana-Champaign, USA) 1.09–30.11, Alessandro Greco (Università degli Studi di Padova, Italy) 23.01– 18.06, Beatrice Giudici (University of Valencia, Spain) 1.04–30.06, Claude Cournoyer-Cloutier (McMaster University, Canada) 1.04–31.07, Atal Agrawal (DAAD scholarship from Indian Institute of Technology Roorkee, India) 31.5–31.7, Aura Obreja (Heidelberg University, Germany) 15.11–31.12, Ivan Cabrera Ziri (Heidelberg University, Germany) 22.11–31.12, Natalya Lyskova (Space Research Institute of Russian Academy of Sciences, Russia) 3.11–29.11, Jenny Gonzalez (Pontificia Universidad Católica de Chile, Chile) 30.10.23–30.11, Franklin Bolivar Aldas (Observatorio Astronómico de Quito, Ecuador) 19.6.–20.11, Andrei Beloborodov (Columbia University, USA) 3.10.23–15.1.24, Jiamin Hou (MPE and University of Florida, USA) 24.05–20.07, Patricia Tissera (Pontificia Universidad Católica de Chile, Chile) 10.07–28.07, Ken Osato (Chiba University, Japan) [mid August - end September], Paolo Mazzali (Liverpool John Moores University, UK) 30.7–30.9., Elena Pian (INAF OAS, Bologna, Italy) 30.07–30.9., Paula Lopez (National University of La Plata, Argentina) 9.07–23.09, Marco Marinucci (Technion institute of Haifa, Israel), Analkar Dutta (Indian Institute of Science, India) 8.01–11.02.

Externe Sprecher von dem "Kavli Summer Program In Astrophysics 2023" am MPA:

Felix Ahlborn (Heidelberg Institute for Theoretical Studies (HITS), Germany) 25.06–05.08, Oliva Andre (Observatory of Geneva, Switzerland) 31.07–05.08, Carles Badenes (University of Pittsburgh, USA) 25.06–28.07, Brandon Barker (Michigan State University, USA) 24.06–05.08, Evan Bauer (Harvard University, USA) 29.06–22.07, Aakash Bhat (University of Potsdam, Germany) 25.06–05.08, Ilaria Caiazzo (California Institute of Technology, USA)25.06–22.07, Diego Calderon (University of Hamburg, Germany) 23.07–05.08, Mami Deka (Cotton University India, India) 25.06–06.08., Marcus DuPont (New York University, USA) 25.06–05.08, James Fuller (California Institute of Technology, USA) 24.06–05.07, Ylva Goetberg (Carnegie Observatories, USA) regular visits from 25.06–05.08, Aldana Grichener (Technion, Israel) 22.06–05.08, Alex Heger (Monash University, Australia) 17.07–28.07, Cole Johnston (Radboud University, Netherlands) two stays during 25.06–03.08, Breivik Katelyn (North Western University, USA) 01.07–06.07, Fragkos Anastasios (University of Geneva, Switzerland) 04.07–07.07, Kerzendorf Wolfgang (Michigan State University, USA) 26.6–30.06, Sills Alison (McMaster University, Canada) 08.07–15.07, Walch-Gassner Steffi (University of Colgne, Germany) 03.07–14.07, Juma Kamulali (Makerere University, Uganda) 02.07–23.07, Camille Landri (Charles University Czech Republic)

25.6–05.08, Norbert Langer (Argelander Institute for Astronomy Bonn, Germany) 22.7–05.08, Linhao Ma (California Institute of Technology, USA) 22.6–25.08, Shazrene Mohamed (University of Miami in Florida (now at University of Virginia), USA) 25.6–17.07, Facundo David Moyano (University of Geneva, Switzerland) 25.06–19.08, Kaila Nathaniel (University of Bonn, Germany) 25.06–05.08, Aleksandra Olejak (Polish Academy of Sciences, Poland) 23.7–10.08, Rachel Patton (Ohio State University, USA) 25.06–05.08, Mathieu Renzo (Center for Computational Astrophysics, Flatiron Institute, USA) five weeks during 25.06–04.08, Paul Ricker (University of Illinois, USA) 25.06–05.08, Jakob Stegmann (Cardiff University, UK) 3 weeks during 27.06–05.08, Jorge Stipetich Cuadra (Pontificia Universidad Católica de Chile, Chile) 01.07–27.07, Christopher Tiede (Niels Bohr Institute, Denmark) 25.06–05.08, Santiago Torres (University of California Los Angeles, USA) 23.06–05.08, Alessandro Alberto Trani (Niels Bohr Institute, Denmark) four weeks during 25.06–29.07, Lieke Van Son (Flatiron Institute, USA) 06.07–07.07, Ashlin Varghese (Newcastle University, UK) 25.06–06.08, Tom Wagg (University of Washington, USA) 25.06–05.08, Xing Zepei (University of Geneva, Switzerland)

1.2 Instrumente und Rechenanlagen

Am MPA wurde immer besonderer Wert auf numerische Astrophysik und damit auf das Vorhandensein exzellenter Rechner-Kapazitäten gelegt, auf das die Wissenschaftler sowohl am Institut selbst als auch extern zugreifen können. Zur Zeit besteht das institutseigene Computersystem aus zentralen Linux-basierten Rechner-, Daten- und Netzwerk-Servern. Diese werden von der hauseigenen IT-Gruppe betrieben. Die Nutzer haben freien Zugang zu den zentralen Systemen über Linux-basierte Desktop-PCs oder ihre Laptops und VPN. Die Daten werden ebenfalls zentral auf Fileservern mit einer Gesamtkapazität von mehreren 100 Terabyte verwaltet und über das AFS-Filesystem verteilt. Für alle kritischen Daten wird täglich ein Back-up erstellt. Zusätzlich zu den mehr als 150 voll ausgestatteten Arbeitsplatz-PCs haben die Nutzer Zugang zum zentralen Rechenzentrum des MPA. Der hauseigene Cluster bietet derzeit etwa 3000 Kerne. Die gesamte Online-Plattenkapazität am MPA liegt im Petabyte-Bereich, wobei einzelne Nutzer je nach wissenschaftlichem Bedarf über Speicherplatz von wenigen GB bis zu duzenden TB verfügen. Energieverbrauch und Kühlung sind ein entscheidender Aspekt von IT-Installationen geworden. Das MPA konzentriert sich deshalb auf Hardware mit geringem Stromverbrauch und effiziente, umweltfreundliche Kühlung.

Für außerordentliche Anforderungen haben MPA-Wissenschaftler Zugang zum zentralen Rechenzentrum der Max-Planck Gesellschaft in Garching (MPCDF), das nur wenige hundert Meter entfernt liegt, sowie das nahe Leibniz-Rechenzentrum des Freistaats Bayern (LRZ) und andere deutsche Superrechenzentren (z.B. in Stuttgart und Jülich). Das MPCDF bietet unter anderem hoch-parallele Supercomputer, eine große Zahl an weiteren leistungsfähigen Compute-Clustern, von denen einiger ausschließlich vom MPA genutzt wird, zusammen mit einem Massenspeicher mit einer Gesamtkapazität im multi-Petabyte-Bereich. Dies ist der Freya-Cluster.

1.3 Gebäude und Bibliothek

Das MPA-Gebäude wurde 1979 von den Architekten Fehling und Gogel im Forschungsgelände Garching, in enger Nachbarschaft zu dem von den gleichen Architekten konzipierten Hauptquartier der Europäischen Südsternwarte (ESO), gebaut. In den folgenden Jahrzehnten wuchs in Garching eines der führenden Wissenschaftszentren Europas heran, und ESO, MPA und MPE bilden heute gemeinsam die größte Zusammenballung exzellenter astrophysikalischer Forschungskapazitäten in Europa. Die Bibliothek befindet sich in der Astrogebäude und wird von Wissenschaftlern zweier Institute genutzt, das MPA und MPE. Die Bibliothek besitzt aktuell ca. 50.000 Bücher, Konferenzproceedings und Zeitschriftenbände, sowie Abonnements für 125 gedruckte und ca. 500 elektronische wissenschaftliche Zeitschriften. Für die Archivierung elektronischer Publikationen benutzen wir das Pure System der Max-Planck Digital Library.

2 Wissenschaftliche Arbeiten

3 Akademische Abschlussarbeiten

3.1 Masterarbeiten

Abgeschlossen: 3

Aniruddh Herle: Selection functions of strong lens finding neural networks. Ludwig-Maximilians-Universitär München

Alina Fantauzzi: Socio-Physical Simulations of Reputation Dynamics. Ludwig-Maximilians-Universitär München

Philipp Straub: Post-Newtonian and Three-Body Effects on the Orbits of Galactic Centre Stars. Ludwig-Maximilians-Universitär München

3.2 Dissertationen

Abgeschlossen: 10

Daniel Kresse: Towards Energy Saturation in Three-dimensional Simulations of Core-collapse Supernova Explosions. Technische Universität München

Oliver Zier: Taming Rotationally Supported Disks Using State of the Art Numerical Methods. Ludwig-Maximilians-Universitär München

Ivan Kostyuk: Investigating Lyman Continuum Escape Fractions of High Redshift Galaxies During the Era of Reionization. Ludwig-Maximilians-Universitär München

Laura Herold: Resolving the Hubble Tension with Early Dark Energy, Ludwig-Maximilians-Universitär München

Andrija Kostic: Forward Modelling the Large-scale Structure: from the Effective Field Theory to Dark Matter Constraints and Future Survey Optimization. Ludwig-Maximilians-Universitär München

Eirini Batziou: Neutron Star Formation in Accretion-Induced Collapse of White Dwarfs. Technische Universität München

Nahir Muñoz-Elgueta: Multi-Phase Gas Reservoirs in and Around High-z Galaxies. Ludwig-Maximilians-Universitär München

Jakob Ehring: Fast Neutrino Flavor Conversions in Core-Collapse Supernova Simulations. Technische Universität München

Jianhang Chen: Distant, dusty star-forming galaxies. Ludwig-Maximilians-Universitär München

Miha Cernetic: High-Order Discontinuous Galerkin Hydrodynamics for Supersonic Astrophysical Turbulence. Ludwig-Maximilians-Universitär München

4 Veröffentlichungen

A. V. Meshcheryakov, G. A. Khorunzhev, S. A. Voskresenskaya, ..., M. R. Gilfanov, and R. A. Sunyaev, "SRGz: Classification of eROSITA Point X-ray Sources in the 1%DESI Region and Calibration of Photometric Redshifts," Astronomy Letters-A Journal of Astronomy and Space Astrophysics 49 (11), 646-661 (2023).

G. S. Uskov, S. Y. Sazonov, M. R. Gilfanov, I. Y. Lapshov, and R. A. Sunyaev, "X-ray Properties of the Luminous Quasar PG 1634+706 at z=1.337 from SRG and XMM-Newton Data," Astronomy Letters-A Journal of Astronomy and Space Astrophysics 49 (11), 621-638 (2023).

I. Kostyuk, R. Lilow, and M. Bartelmann, "Baryon-photon interactions in Resummed Kinetic Field Theory," Journal of Cosmology and Astroparticle Physics 2023 (9), 032 (2023).

I. Kostyuk, D. Nelson, B. Ciardi, M. Glatzle, and A. Pillepich, "Ionizing photon production and escape fractions during cosmic reionization in the TNG50 simulation," Monthly Notices of the Royal Astronomical Society 521 (2), 3077-3097 (2023).

E. Gatuzz, A. G. Javier, E. Churazov, and T. R. Kallman, "Searching for the warm-hot intergalactic medium using XMM–Newton high-resolution X-ray spectra," Monthly Notices of the Royal Astronomical Society 521 (2), 3098-3107 (2023).

J. R. Eskilt, L. Herold, E. Komatsu, K. Murai, T. Namikawa et al., "Constraints on Early Dark Energy from Isotropic Cosmic Birefringence," Physical Review Letters 131 (12), 121001 (2023).

P. Arévalo, P. Lira, P. Sánchez-Sáez, P. Patel, ..., E. Churazov et al., "Optical variability in quasars: scalings with black hole mass and Eddington ratio depend on the observed time-scales," Monthly Notices of the Royal Astronomical Society 526 (4), 6078-6087 (2023).

D. Chattopadhyay, J. Stegmann, F. Antonini, J. Barber, and I. M. Romero-Shaw, "Double black hole mergers in nuclear star clusters: eccentricities, spins, masses, and the growth of massive seeds," Monthly Notices of the Royal Astronomical Society 526 (4), 4908-4928 (2023).

J. Borrow, R. Kannan, ..., A. Smith, R. Pakmor, V. Springel et al.,"THESAN-HR: how does reionization impact early galaxy evolution?," Monthly Notices of the Royal Astronomical Society 525 (4), 5932-5950 (2023).

D. D. Hendriks, L. A. C. van Son, M. Renzo, R. G. Izzard, and R. Farmer, "Pulsational pair-instability supernovae in gravitational-wave and electromagnetic transients," Monthly Notices of the Royal Astronomical Society 526 (3), 4130-4147 (2023).

T. Ryu, R. Valli, R. Pakmor, ..., S. E. de Mink, and V. Springel, "Close encounters of black hole—star binaries with stellar-mass black holes," Monthly Notices of the Royal Astronomical Society 525 (2), 5752-5766 (2023).

K. E. Heintz, A. D. Cia, C. C. Thöne, J. Krogager, R. M. Yates et al., "The cosmic buildup of dust and metals - Accurate abundances from GRB-selected star-forming galaxies at $1.7 < z < 6.3$," Astronomy and Astrophysics 679, A91 (2023).

B. Cseh, G. Csörnyei, L. Szabados, B. Csák, J. Kovács et al., "Orbit determination for the binary Cepheid V1344 Aql," Astronomy and Astrophysics 680, A89 (2023).

C. Gouin, M. Bonamente, D. Galarraga-Espinosa, S. Walker, and M. Mirakhor, "Soft X-ray emission from warm gas in IllustrisTNG circum-cluster environments - I. Sample properties, methods, and initial results," Astronomy and Astrophysics 680, A94 (2023).

T. Battich, M. M. M. Bertolami, A. M. Serenelli, S. Justham, and A. Weiss, "A self-synthesized origin for heavy metals in hot subdwarf stars," Astronomy and Astrophysics 680, L13 (2023).

A. Rawlings, M. Mannerkoski, P. H. Johansson, and T. Naab, "Reviving stochasticity: uncertainty in SMBH binary eccentricity is unavoidable," Monthly Notices of the Royal Astronomical Society 526 (2), 2688-2695 (2023).

M. R. Drout, Y. Götberg, B. A. Ludwig, ..., S. E. de Mink, and N. Smith, "An observed population of intermediate-mass helium stars that have been stripped in binaries," Science 382 (6676), 1287-1291 (2023).

T. Bakx, T. Kurita, N. E. Chisari, Z. Vlah, and F. Schmidt, "Effective field theory of intrinsic alignments at one loop order: a comparison to dark matter simulations," Journal of Cosmology and Astroparticle Physics 2023 (10), 005 (2023).

W. Elbers, C. S. Frenk, A. Jenkins, B. Li, ..., and V. Springel, "Where shadows lie: reconstruction of anisotropies in the neutrino sky," Journal of Cosmology and Astroparticle Physics 2023 (10), 010 (2023).

S. M. Delos, and S. D. M. White, "Prompt cusps and the dark matter annihilation signal," Journal of Cosmology and Astroparticle Physics 2023 (10), 008 (2023).

E. B. Holm, L. Herold, T. Simon, E. G. Ferreira, S. Hannestad et al., "Bayesian and frequentist investigation of prior effects in EFT of LSS analyses of full-shape BOSS and eBOSS data," Physical Review D 108 (12), 123514 (2023).

R. Szakacs, C. Péroux, D. Nelson, M. A. Zwaan, ..., and B. Casavecchia, "The BarYon Cycle project (ByCycle): identifying and localizing Mg ii metal absorbers with machine learning," Monthly Notices of the Royal Astronomical Society 526 (3), 3744-3756 (2023).

M. R. Gomer, S. Ertl, ..., H. Wang, A. Galan, ..., and S. H. Suyu, "Accelerating galaxy dynamical modeling using a neural network for joint lensing and kinematic analyses," Astronomy and Astrophysics 679, A59 (2023).

S. Weng, C. Peroux, R. Ramesh, D. Nelson, ..., and B. Casavecchia, "The physical origins of gas in the circumgalactic medium using observationally motivated TNG50 mocks," Monthly Notices of the Royal Astronomical Society 527 (2), 3494-3516 (2023).

B. Hadzhiyska, S. Ferraro, R. Pakmor, ..., V. Springel, S. D. M. White et al., "Interpreting Sunyaev–Zel'dovich observations with MillenniumTNG: mass and environment scaling relations," Monthly Notices of the Royal Astronomical Society 526 (1), 369-382 (2023).

M. R. Siebert, L. A. Kwok, ..., R. Pakmor, N. Smith, and L. Wang, "Ground-based and JWST Observations of SN 2022pul. I. Unusual Signatures of Carbon, Oxygen, and Circumstellar Interaction in a Peculiar Type Ia Supernova," The Astrophysical Journal 960 (1), 88 (2023).

E. Vanzella, F. Loiacono, P. Bergamini, ..., M. Gronke, G. B. Caminha et al., "An extremely metal-poor star complex in the reionization era: Approaching Population III stars with JWST," Astronomy and Astrophysics 678, A173 (2023).

A. Y. Kirichenko, S. V. Zharikov, A. V. Karpova, E. Fonseca, ..., M. R. Gilfanov et al., "The black widow pulsar J1641+8049 in the optical, radio, and X-rays," Monthly Notices of the Royal Astronomical Society 527 (3), 4563-4572 (2023).

J. M. Diego, M. Pascale, B. Frye, A. Zitrin, ..., G. B. Caminha et al., "Exploring the correlation between dark matter, intracluster light, and globular cluster distribution in SMACS0723," Astronomy and Astrophysics 679, A159 (2023).

L. I. Scheel-Platz, J. Knollmüller, P. Arras, P. Frank, M. Reinecke et al., "Multicomponent imaging of the Fermi gamma-ray sky in the spatio-spectral domain," Astronomy and Astrophysics 680, A2 (2023).

S. S. Vasylyev, C. Vogl, Y. Yang, A. V. Filippenko, T. G. Brink et al., "Early-time Ultraviolet and Optical Hubble Space Telescope Spectroscopy of the Type II Supernova 2022wsp," Astrophysical Journal, Letters 959 (2), L26 (2023).

Y. Götberg, M. R. Drout, A. P. Ji, ..., N. Smith, and S. E. de Mink, "Stellar Properties of Observed Stars Stripped in Binaries in the Magellanic Clouds," The Astrophysical Journal 959 (2), 125 (2023).

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5 Lehrtätigkeit und Gremientätigkeit

5.1 Lehrtätigkeiten: Vorlesungen

T. A. Enßlin, WS 2023, LMU München
- Information theory (1/3 semester)
- Information field theory (2/3 semester)
T. A. Enßlin: (LMU München, Garching, 25.9.-29.9.)
- Signal reconstruction with Python, (key qualification course)
T. A. Enßlin: (LMU München, Garching, 10.10.)
- Artificial Intelligence, Bayes, & Cognition (seminar)
M. Gronke: Astrophysical Gas Dynamics, WS23/24, LMU
J. Grupa with G. Csoernyei, SS 2023, TUM, München, Tutorial for Extragalactic Astrophysics
J. Grupa with S. Huber and I. T. Andika, WS 2023/24, TUM, München, Tutorial for Gravitational Lensing
W. Hillebrandt, WS 2022/2023, TUM, München

- Observational Cosmology
H.-Th. Janka, WS 2022/2023 and SSS 2023, TUM, München:
- Exploding Stars
- Introduction to Theoretical Astrophysics
H.-Th. Janka: ISAPP 2023: Neutrino physics, astrophysics and cosmology
(Varenna, Italy, 27.06.-06.07.)
H.-Th. Janka: Mainz Physics Academy (Frauenchiemsee, 11.09.-15.09.)
E. Komatsu, MC Specialized Course (1 unit of intensive course, 6.-30.6.), Nagoya University, Nagoya, Japan:- Parity Violation in Cosmology
S. Suyu, WS 2022/2023 and SS2023, TUM, München:
- Experimental Physics 1 in English
- Gravitational Lensing
- Experimental Physics 4 in English
- Extragalactic Astrophysics
- FOPRA Experiment 85: Colour-Magnitude Diagrams of Star Clusters: Determining Their Relative Ages
Achim Weiss, WS 2022/2023 and SS 2023
- Stellar Structure and Evolution II
- Nucleosynthesis
- Seminar on Stellar Astrophysics

5.2 Gremientätigkeit

T. Battich: External postdoc representative at MPA
B. Ciardi: Vice-president of the IAU J2 Organizing Committee
B. Ciardi: Vice-chair of the GLOW Consortium
B. Ciardi: Member of the GLOW Consortium Resource Allocation Committee
B. Ciardi: Member of the GLOW Executive Committee
B. Ciardi: SOC member of the conference LOFAR Family Meeting, Leiden, The Netherlands (2024)
B. Ciardi: SOC member of the conference Cosmic Origins: The First Billion Years, Santa Barbara, USA (2024)
B. Ciardi: SOC member of the GLOW Annual Meeting, Bochum, Germany (2023)
B. Ciardi: SOC member of the conference LOFAR Family Meeting, Olsztyn, Poland (2023)
B. Ciardi: SOC member of the conference Present and Future of Line Intensity Mapping, Garching bei München, Germany (2023)
B. Ciardi: LOC member of the conference Present and Future of Line Intensity Mapping, Garching bei München, Germany (2023)
B. Ciardi: gender equality officer
B. Ciardi: Ombudsperson
B. Ciardi: member of the PhD Thesis Committee panel
B. Ciardi: organizer of the Institute Seminar
B. Ciardi: member of staff and postdoc hiring committees
M. Chruslinska: postdoc representative
M. Chruslinska: local organising committee member, the ENGRAVE Collaboration meeting, Garching, Germany
E. Churazov: Organisation of the MPA Institute Seminar
E. Churazov: IMPRS-related activities
T. A. Enßlin: Editorial Board Member of the Journal for Cosmology and Astroparticle Physics
T. A. Enßlin: Editorial Board Member of the Journal Entropy
T. A. Enßlin: Member of DLR Review Board for “Verbundforschung”
T. A. Enßlin: Member of BMBF Review Board for “Verbundforschung”
T. A. Enßlin: Member of SOC: Debating the Potential of Machine Learing in Astronomical Surveys #2, (Paris/New York, France/USA, 27.11.-1.12.)

T. A. Enßlin: Head of SOC: ErUM-Data Workshop on Inverse Problems (Garching, Germany, 5.12.-6.12.)
T. A. Enßlin: Member of SOC: The Road Differentiable and Probabilistic Programming in Fundamental Physics (Garching, Germany 26.6.-28.6.)
T. A. Enßlin: Member of SOC: Differentiable and Probabilistic Programming for Fundamental Physics (Garching, Germany, 5.6.-30.6.)
T. A. Enßlin: Member of SOC: Towards a Comprehensive Model of the Galactic Magnetic Field (Stockholm, Sweden, 3.4.-28.4.)
T. A. Enßlin: Member of SOC: RESOLVE workshop (Bonn, Germany, 24.10.-27.10.)
F. Ferlito: IMPRS PhD student representative (contributed in the organisation of various events, including Monthly collaboration meetings for IMPRS students, yoga courses, joint IMPRS Munich-Heidelberg workshop, and social dinners)
R. Glas: Offered planetarium shows to a group of approx 25 visitors in April and October 2023
J. González Lobos: IMPRS student representative (November 2020 - 2024)
J. González Lobos: Member of Local Organizing Committee, The Multiphase Circumgalactic Medium conference, 26 February - 3 March, 2023
J. Hein: SESTAS organizing commitee
H.-Th. Janka: Advisory Panel of "Sterne und Weltraum"
H.-Th. Janka: Editorial Board of the "Journal of Cosmology and Astroparticle Physics (JCAP)"
G. Jin: Organisation of the 15th IMPRS Symposium - 05.06.2023
E. Komatsu: Perspektivenkommission of the Max Planck Society
E. Komatsu: Chair of the Munich Joint Astronomy Colloquium
E. Komatsu: PhD Supervisory Panel
E. Komatsu: External Evaluation Committee, National Astronomical Observatory of Japan
E. Komatsu: Selection Committee for the Shaw Prize
E. Komatsu: ArXiv Scientific Advisory Board
D. Kresse: Active member of MPA's planetarium group
T. Naab: Scientific head of the IT department
T. Naab: MPA representative in the library board
T. Naab: MPA contact person for MPCDF
V. Muralidhara: Internal PhD representative
V. Muralidhara: External PhDnet representative
A. Weiss: SOC member of "Unveiling the interiors of stars to grasp stellar populations" (2024)
J. Stadler: New Strategies for Extracting Cosmology from Future Galaxy Surveys", 07/23 Sesto
J. Stadler: "Black Hole and Gravitational Wave Day", 12/05/23, Garching
J. Stadler: "Munich Dark Matter Meeting"
S. Suyu: one of the coordinators of the MIAPbP workshop on "The Extragalactic Distance Scale and Cosmic Expansion in the Era of Large Surveys and the James Webb Space Telescope" in July 2023
S. Suyu: co-organised TUM Physics Day of Diversity in November 2023
S. Suyu: serving on various thesis committees
S. Vegetti: MPA fellowship selection
S. Vegetti: Origins RUD coordinator
S. Vegetti: JAC committee
C. Vogl: organiser of the MPA/MPE/ESO supernova meeting
C. Vogl: Google Summer of Code mentor for the TARDIS RT Collaboration

5.3 Kolloquiumsvorträge

A. Acharya: Nordic Institute for Theoretical Physics (NORDITA), (Stockholm, Sweden, 19.4.)M. Chruslinska: Astrophysics Seminar, Warsaw University Observatory, Warsaw, Poland 05/2023
M. Chruslinska: Gravitation Group Seminar, Labolatoire Astroparticule & Cosmologie, Paris, France (online) 05/2023
M. Chruslinska: Astrophysics Seminar, Geneva Observatory, Switzerland 08/2023
E.Churazov: The University of Alabama in Huntsville (Huntsville, USA, 28.3.)
G. Csoernyei: Astromerique seminar series, University of Montréal (online, Feb 2023)
B. Ciardi: Center for Astroparticle Physics, (Erlangen, Germany, 20.7)
S.E. de Mink, Invited Institute Seminar, Astrophysics department, Hebrew University, Israel, 2023 May 28
S.E. de Mink, Invited Colloquium, Tel Aviv University, Israel, 2023, May 31
S.E. de Mink, Invited Colloquium, Leiden University, The Netherlands, 2023, Nov 9
S.E. de Mink, Rosenblum Lecture (invited), Physics Department of the Hebrew University, Israel
P. Diego-Palazuelos: Copernicus Webinar and Colloquium Series (online, 24.10.2023)
G. Edenhofer: Invited Seminar at Space Telescope Science Institute @ Baltimore, MD, USA
G. Edenhofer: Invited Special Seminar at MIT Haystack @ Westford, MA, USA
T. A. Enßlin: CAS Research Focus "New Foundations for Physics" , LMU (Munich, Germany, 5.6.)
T. A. Enßlin: Landessternwarte Tautenburg (Tautenburg, Germany, 17.10.)
T. A. Enßlin: MPI for Radioastronomy (Bonn, Germany, 27.10.)
G. Jin: The European Southern Observatory (Garching, Germany, 02.11.2023)
D. Galárraga-Espinosa: UC Davis (Davis, USA, 20.03.2023)
D. Galárraga-Espinosa: UC Berkeley (Berkeley, USA, 21.03.2023)
A. Genina: Strasbourg Observatory,(Strasbourg, France,08.09.2023)
M. Gilfanov: Institute of High Energy Physics, Beijing, China, 19.07.
M. Gilfanov: Tsinghua University, China, 18.07.
J. González Lobos: The Multiphase Circumgalactic Medium conference,"Characterizing the powering mechanisms of extended Lyman-alpha emission using submm-bright galaxies" , Ringberg Castle 28.02.2023 - (contributed talk) M. Gronke: AIP (remote)
M. Gronke: Hamburg Observatory
H.-Thomas Janka: Goethe Universität Frankfurt (Frankfurt, 22.11.)E. Komatsu: Westfälische Wilhelms-Universität Münster (Münster, Germany, 27.1.)
E. Komatsu: Flatiron Institute (New York, USA, 3.2.)
E. Komatsu: Universität Innsbruck (Innsbruck, Austria, 23.5.)
E. Komatsu: Nagoya University (Nagoya, Japan, 16.7.)
E. Komatsu: CERN (Geneva, Switzerland, 13.9.)
Luisa Lucie-Smith: The Oskar Klein Centre, Stockholm, Sweden. Astrophysics Colloquium, invited talk. October 2023.
Luisa Lucie-Smith: Scuola Internazionale Superiore di Studi Avanzati (SISSA), Italy. Astrophysics and Cosmology seminar, invited talk. June 2023.
Luisa Lucie-Smith: University of Vienna. Astrophysics Colloquium, invited talk. March 2023.
Luisa Lucie-Smith: Ludwig Maximilian University of Munich, Germany. Lunch seminar, invited talk. February 2023 T. Naab: Astrophysics colloquium, University of Zurich, December 1st, 2023
R. Pakmor: "Auriga Superstars" , ICC Durham (8.9.)
R. Pakmor: "The origin of galactic
magnetic fields" , Cardiff University (18.9.)
R. Pakmor: "Auriga Superstars" , AIP Potsdam (25.5.)
D. Powell: Cosmology Seminar, Stanford University Stanford, CA, USA
D. Powell: Cosmology and Astronomy Seminar, UC Davis Davis, CA, USA

D. Powell: Seminar, USC Department of Physics and Astronomy Los Angeles, CA, USA
D. Powell: Astronomy Seminar, UC Riverside Riverside, CA, USA
D. Powell: Tuesday Lunch Talk, UCLA Department of Astronomy Los Angeles, CA, USA
D. Powell: Nature of Dark Matter on Small Scales Seminar USA (virtual)
D. Powell: GECO Seminar, Laboratoire d'Astrophysique de Marseille Marseille, France (virtual)
T. Ryu: Department Seminar, the Univeristy of the Balearic Islands, Spain 12/2023
T. Ryu: Astronomy Seminar, the Univeristy of Nova Gorica, Slovenia 11/2023
T. Ryu: Department Colloquium, Kyung Hee University, Korea 11/2023
T. Ryu: Plasma Physics Seminar, Max Planck Institute for Plasma Physics, Germany 11/2023
T. Ryu: Department Colloquium, SNU, Korea 10/2023
T. Ryu: Colloquium, Korea Astronomy & Space Science Institute, Korea 10/2023
T. Ryu: Lagrange Seminar, Lagrange Laboratoire, France 09/2023
T. Ryu: Astronomy Seminar, Max-Planck Institute for Gravitational Physics(AEI), Germany 09/2023
T. Ryu: Special Seminar, New York University, USA 09/2023
T. Ryu: Astronomy Seminar, Columbia, USA 09/2023
T. Ryu: Astronomy Seminar, Stony Brook University, USA 09/2023
T. Ryu: Special Seminar, Northwestern University(CIERA), USA 08/2023
T. Ryu: MPA/Kavli Summer Program Seminar, MPA, Germany 06/2023
T. Ryu: HUJI Astrophysics Seminar, HUJI, Isreal 03/2023
F. Schmidt: Utrecht University (11.10.23)
F. Schmidt: Princeton University (14.11.23)
F. Schmidt: IFAE Barcelona (23.11.23)
S. H. Suyu: Institute of Astronomy, National Central University, (Chungli, Taiwan, 10.3.)
S. Suyu: University of Milan, (Milan, Italy, 11.5.)
S. Suyu: GRAPPA (Gravitation & Astroparticle Physics Amsterdam), University of Amsterdam, (Amsterdam, the Netherlands, 23.10.)
S. Suyu: Munich Physics Colloquium, Ludwig Maximilian University of Munich / Technical University of Munich, (Munich, Germany, 13.11.)
S. Taubenberger: INAF Osservatorio Astronomico di Padova (Padova, Italy, 20.11.)
A. Vigna-Gómez: NBIA Astroparticle Seminar (Copenhagen, Denmark, 04.09)
C. Wang: Department of Physics, Tianjin Normal University, (Tianjin, China, 31.03.2023)
C. Wang: National Astronomical observatories, (Beijing, China, 06.04.2023)
C. Wang: Department of Astronomy, Beijing Normal University, (Beijing, China, 06.04.2023)
C. Wang: Department of Physics, Tsinghua University (Beijing, China, 07.04.2023)
C. Wang: Yunan Astronomical observatories, (Kunming, China, 10.04.2023)
C. Wang: Department of Physics, Anhui Normal University, (Wuhu, China, 04.05.2023)
C. Wang: School of Astronomy and Space Science, Nanjing University (Nanjing, China, 05.05.2023)

5.4 Eingeladene Review Vorträge

A. Basu: GRASCO seminar series, "Decoding Reionization: Unraveling Impacts of Ionizing Sources through Cosmological RT Simulations" , (IIT Kharagpur,India, January 2024)
R. Pakmor: "Arepo: Current State and Future Plans" , Arepo ISM Metting (Manchester, UK, 11-15.9)
T. A. Enßlin: Debating the Potential of Machine Learing in Astronomical Surveys #2 (Paris/New York, France/USA, 27.11.-1.12.)
T. A. Enßlin: Radio 2023 (Bochum, Germany 14.11.-16.11.)
T. A. Enßlin: "Condensed Complexity" – The Essence of Information Processing and Cognition? (Frankfurt, Germany 8.11.-10.11)
T. A. Enßlin: Sustainability in the Digital Transformation of Basic Research on Universe & Matter (Meinerzhagen, Germany, 30.5.-2.6.)

T. A. Enßlin: EAS 2023 Meeting Special Session 23: Frontier of Interferometric Imaging from Radio to Optical (Krakow, Poland, 14.7.)
T. A. Enßlin: Scientific machine learning for astronomy (Heidelberg, Germany, 14.8.-18.8.)
T. A. Enßlin: 9th International Summer School on AI and Big Data (Dresden, Germany, 3.7.-7.7.)
T. A. Enßlin: VLTI and ALMA Synthesis Imaging (ESO, Garching, Germany, 9.1.-12.1.)
N. Lahén: Two in a million – The interplay between binaries and star clusters, ESO Garching, Germany (Invited talk) "Star formation and feedback in dwarf galaxies with multiphase ISM and individual stars"
D. Powell: APEC Seminar at IPMU Kashiwa, Japan
D. Powell: Kashiwa Dark Matter Symposium 2023 Kashiwa, Japan
F. Schmidt: Kosmologietag (Bielefeld, 2.6.23)
F. Schmidt: LSS workshop, FZU Czech Academy of Sciences (Prague, 28.6.23)
F. Schmidt: Novel physics from galaxy clustering, IFP (Trieste, 6.11.23)
A. Vigna-Gómez: European Astronomical Society (EAS) Annual Meeting (Krakow, Poland, 10.-14.07.)
H.-Th. Janka: SNvD 2023@LNGS: International Conference on Supernova Neutrino Detection (Gran Sasso, Italy, 29.05.-01.06.)
E. Komatsu: XXV SIGRAV Conference (Trieste, Italy, 4.-8.9.)
E. Komatsu: The 14th RESCEU International Symposium (Tokyo, Japan, 30.10.-2.11.)
E. Komatsu: 550 years of the Copernican Universe: our place in the Cosmos (Berlin, Germany, 10.11.)
Luisa Lucie-Smith: Excellence Cluster ORIGINS, Garching, Germany. Data Science days, invited overview talk representing research-unit C (cosmology) of Excellence Cluster ORIGINS. January 2023.
Luisa Lucie-Smith: Institut d'Astrophysique de Paris (France)/Flatiron Institute (USA). Invited panelist in a debate at "Debating the potential of machine learning in astronomical surveys" workshop. December 2023.
S. Taubenberger: Cosmology on Safari (Hluhluwe, South Africa, 6.3.-10.3.)
B. Ciardi: HI as a Cosmological Probe across Cosmic Time (Nazareth, Israel, 15.-19.5)
B. Ciardi: Understanding the epoch of cosmic reionization (Sesto, Italy, 6-10.3)
T. Naab: New simulations for new problems in galaxy formation, France, December 11-15.2023
T. Naab: Galaxy Formation in Hangzhou, China, October 9-13, 2023
T. Naab: CMG@ND, Ireland, September 4-15.2023
E.Churazov: Science with the Line Emission Mapper: From Planets to Galaxies and Beyond (Cambridge, MA, USA, 28.2-3.3)
E.Churazov: Simons Symposium on Multi-Scale Physics (Schloss Elmau, Germany, 27.8-2.9)
S. Vegetti: Origins RU-D science day (Garching, Germany, 19.04)
S. Vegetti: VLBI at 40s (Bologna, Italy, 22.05.-26.05)
S. Vegetti: 17TH international workshop on the dark side of the Universe (Kigali, Rwanda, 10.03-12.03)
S. Vegetti: LeadNet Symposium (Berlin, Germany, 19.09-20.09)
S. Vegetti: Second Workshop on German Science Opportunities for the ngVLA (Leipzig , Germany, 27.10-28.10)
M. Gilfanov: Hot Topics in Modern Cosmology (Cargese, France, 16-22.04)
M. Gilfanov: Detecting Missing Baryons in the Universe (Beijing, China, 20-21.07.)
M. Gilfanov: The Fifth Zeldovich Meeting (Yerevan, Armenia, 12-17.06.)
M. Gilfanov: Cosmology in Miramare (Miramare, Italy, 28.08-2.09.)

5.5 Öffentliche Vorträge:

B. Ciardi: Planetario e Museo dell'Astronomia e dello Spazio, Torino, Italy (29.06.2023)
T. A. Enßlin: Pint of Science Talk at Munich Public Observatory (Munich, Germany, 22.5.)

T. A. Enßlin: Talk at Vor und nach dem Urknall (Bad Honnef, Germany, 22.6.-25.6.)
D. Galárraga-Espinosa: IX Escuela Ecuatoriana de Astronomia y Astrofisica, Quito-Ecuador (remote 01.08.2023)
H.-Th. Janka: Olbersgesellschaft, Bremen (24.01.)
H.-Th. Janka: Astronomiefreunde Nordenham (25.01.)
H.-Th. Janka: Deutsches Museum München (22.02.)
H.-Th. Janka: Volkssternwarte München (10.03.)
E. Komatsu: Botschaft von Japan in Deutschland (Berlin, Germany, 25.2.)
S. Suyu: Delta Electronics Foundation, Taipei, Taiwan (9.3.)
S. Suyu: Taichung First Senior High School, Taichung, Taiwan (18.3.)
S. Suyu: Gaia STEM Lecture Series, Taiwan [online] (18.11.)

Prof. Dr. Eiichiro Komatsu (Geschäftsführender Direktor)