

Garching bei München

Max Planck Institut für Astrophysik

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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 ab 1.1.23), Prof. Dr. Volker Springel [2018-](Geschäftsführender Direktor bis 31.12.22)

ForschungsgruppenleiterInnen/W2 Mitarbeiter

Dr. Fabrizio Arrigoni-Battaia, Dr. Eugene Churazov, Dr. Benedetta Ciardi, Dr. Torsten Enßlin, Dr. Marat Gilfanov, Dr. Max Grönke, Dr. Adrian Hamers (bis 30.11.22), Dr. Hans-Thomas Janka, Dr. Stephen Justham (seit 1.10.22), Dr. Thorsten Naab, Dr. Rüdiger Pakmor, Dr. Fabian Schmidt, Dr. Mahdiah Schmidt (wissenschaftliche Koordination seit 15.10.22), Dr. Sherry Suyu (in 2022 ist Sherry Suyu Max Planck Fellow am MPA, sowie Associate Professor an der Technischen Universität München (TUM) geworden), Dr. Simona Vegetti, Prof. Dr. Achim Weiss.

Wissenschaftliche Mitarbeiter: 47

Dr. Tiara Battich, Dr. Earl Bellinger, Dr. Rebekka Bieri (bis 29.07.22), Dr. Robert Bollig (bis 30.06.22), Dr. Deepika Bollimpalli, Dr. Jan Burger (seit 1.9.22), Dr. Gabriel Caminha, Dr. Paolo Campeti, Dr. Raoul Cañameras, Dr. Seok-Jun Chang, Dr. Martyna Chruslinska, Dr. Tiago Costa, Dr. Linda Blot, Dr. Sten Delos, Dr. Ryan Jeffrey Farber, Dr. Robert James Farmer, Dr. Daniela Galarraga-Espinosa, Dr. Enrico Garaldi, Dr. Anna Genina, Dr. Robert Glas, Dr. Cesar Hernandez-Aguayo, Dr. Andrew Spencer Jamieson, Dr. Valeriya Korol, Dr. Alexandra Kozyreva, Dr. Natalia Lahen, Dr. Qi Li, Dr. Luisa Lucie-Smith, Dr. Alejandra Melo Melo, Dr. Patrick Neunteufel (bis 30.09.22), Dr. Conor O'Riordan, Dr. Devon Powell, Dr. Holly Preece, Dr. Antti Rantala, Dr. Martin Reinecke, Dr. Taeho Ryu, Dr. Adam Linus Schaefer, Dr. Yiping Shu, Dr. Andre Sieverding (seit 1.11.22), Dr. Hannah Stacey, Dr. Rosemary Talbot (seit 1.10.22), Dr. Stefan Taubenberger, Dr. Wilma Trick (bis 31.12.22), Dr. Alejandro Vigna-Gomez (seit 1.12.22), Dr. Christian Vogl, Dr. Chen Wang, Dr. Maria Werhahn (seit 1.12.22), Dr. Naveen Yadav (bis 30.06.22).

Doktoranden: 61

Anshuman Acharya, Felix Ahlborn (bis 30.09.22), Silvia Almada Monter (seit 1.9.22), Abhijeet Anand (bis 31.07.22), Ivana Babic (seit 1.04.22), Arghyadeep Basu, Monica Barrera, Eirini Batziou, Aniket Bhagwat, Teresa Braun (seit 1.09.22), Sergei Bykov, Benedetta Casavecchia (seit 1.09.22), Miha Cernetic, Geza Csoernyei, Hitesh Kishore Das, Vincent Eberle, Gordian Edenhofer, Jakob Ehring, Fulvio Ferlito, Konstantina Fotopoulou, Ilkham Galiullin (bis 31.07.22), Vale Gonzalez Lobos, Alexandra Grudskaia, Matteo Guardiani (seit 1.01.22), Johannes Harth-Kitzerow, Jakob Hein (seit 1.10.22), Malte Heinlein (seit 1.04.22), Laura Herold, Eileen Herwig (seit 1.09.22), Jessica Hislop, Simon Huber (bis 31.12.22), Liliya Imasheva (bis 30.11.22), Gaoxiang Jin (seit 1.09.22), Andrija Kostic, Ivan Kostyuk, Daniel Kresse, Jing-Ze Ma (seit 1.09.22), Simon May (bis 30.09.22), Alexander Mayer (seit 1.10.22), Marta Monelli, Nahir Munoz Elgueta, Vyoma Muralidhara, Simon Ndiritu, Christian Partmann, Perikles Okalidis (bis 31.08.22), Abinaya Swaruba Rajamuthukumar, Katlego Ramalatswa (seit 16.08.22), Bryce Alexander Remple, Johannes Maximilian Ringler, Jakob Roth, Julian Rüstig, Stefan Schuldt (bis 28.02.22), Lazaros Souvatzis, Joanne Tan (seit 1.09.22), Beatriz Tucci-Schiewaldt, Ruggero Valli (seit 1.10.22), Pavan Vynantheya, Han Wang (seit 1.03.22), Margret Westerkamp (seit 1.01.22), Hanieh Zandinejad (seit 22.7.22), Oliver Zier.

Masterstudenten: 18

Tiberio Ceccarelli (bis 30.9.2022), Gabriela Cudmani (bis 30.08.22), Nikolaus Deiser (bis 30.04.22), Christoph Eberle (bis 30.07.22), Richard Fuchs (bis 30.09.22), David Gorbunov (bis 30.09.22), Matteo Guardiani (bis 30.10.22), Jakob Hein (bis 28.02.22), Malte Heinlein (bis 30.03.22), Amiruddh Herle (bis 15.08.22), Silvian Hofs (bis 1.11.22), Mirnal Jetty (seit 1.08.22), Severin Magel (bis 30.11.22), Michael Metz (bis 30.04.22), Andres Ramirez (bis 30.09.22), Igor Rzhin (seit 1.11.22), Ankit Shresta, Philipp Sebastian Straub (seit 1.04.22).

Sekretariat: 5

Maria Depner, Sonja Gründl, Gabriele Kratschmann, Cornelia Rickl, Isabel Thapa (seit 1.09.22)

Verwaltungsleitung:

Pia Fischhaber (seit 1.3.2022)

Technische Mitarbeiter: 8

Computational Support: Heinz-Ado Arnolds (IT management), Andreas Breitfeld, Goran Toth, Andreas Weiss

Library: Mirna Balicevic, Christiane Bartels (library management), Elisabeth Blank.

Public relation: Dr. Hannelore Hämmerle (MPA und MPE)

Praktikanten: 5

Lennard Dufner, Charalampos Nikolis, Fernando Hidalgo Pineda, Ludmila Schneider, Jennifer Shi

Gäste: 43

Marcello Russo (Universidad de Salamanca) 01.01-13.02, Chervin Laporte (University of Victoria) 01.01-31.01, Kerstin Kunze (University of Geneve) 20.02-31.05, Herle Anirudh (LMU) 21.02-21.08, Dolunay Kocak (Ege Univ. Izmir) 15.03-15.04, Lennart Buhmann (Universitaet zu Koeln) 20.03-21.03, Prashin Jethwa (University of Vienna) 21.03-24.03, Yohan Dubois (Institute d'Astrophysique de Paris) 17.03-18.03, Silvia Bonoli (Donostia, Spain) 18.04-07.08, Raul Angulo (Donostia, Spain) 18.04-07.08, Hector Javier Hortua Orjuela (Univ. de Colombia) 16.04-16.07, Luc Dessart (Paris) 15.05-02.07, Wynn Jacobson-Galan (University of California) 29.05-24.06, Federico Iza (Univ. de Buenos Aires) 07.05-01.08, Ezeguiel Lozano (Univ. de Buenos Aires) 07.05-01.08, Agustin Rodriguez (IATE, Cordoba) 03.05-22.07, David Aguilera-Dena (Crete, Greece) 15.05-19.06, Andrei Beloborodov (Columbia Univ.) 01.06-01.12, Chad Bustard (Ohio State Univ.) 08.06-04.07, Michele Manno (SUNY Oswego) 01.06-20.07, Selim Kalici (SUNY Oswego) 01.06-20.07, Hyph Riley Randall (SUNY Oswego) 01.06-20.07, Arun Kumar Pandey (India) 01.06-01.07, Catalina Casanueva (Univ. Catolica de Chile) 01.06-31.07, Fernando Hidalgo Pineda (Univ. of Glasgow) 06.06-15.07, Charalampos Nicolas (LMU) 13.06-15.09, Oskar Hafstad (Univ. of Oslo) 16.06-20.08, Julio Navarro (Univ. of Victoria) 09.07-24.07, Patricia Tissera (Universidad Catolica de Chile) 04.07-02.08, Sergio Contreras (San Sebastian) 17.07-30.07, Alexander Heger (Monash Univ., Australia) 11.07-05.08, Andreas Filipp (Montreal) 15.07-15.08, Graziano Rossi (Seoul, Korea) 20.07-24.08, Paolo Mazzali (Triest Observ.) 25.07-12.08, 01.09-30.09, Elena Pian (Pisa) 25.07-12.08, Ewoud Wempe (Univ. Groningen) 14.07-22.07, 22.11-21.12, Marcelo Miller Bertolami (La Plata, Argentinien) 22.08-09.09, Michael Michaux (Nice, France) 10.08-24.08, Stefany Guadalupe (Cornell Univ.) 05.08-28.08, Stephane Blondin (Marseille) 01.09-30.11, Jose Luis Bernal (Institute of Physics of Cantabria, Spain) 03.10-01.01.23, Zhiyuan Yao (Hebrew Univ. of Jerusalem) 07.10-20.10, Norhasliza Yusof (Univ. of Malaya) 30.10-26.11.

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: 8

Tiberio Ceccarelli: Circular polarization of astrophysical sources. LMU.

Nikolaus Deiser: Kinematic Properties of Magnetic B Stars and a Search for a Link to the Origin of Magnetic Fields. LMU.

Richard Fuchs: Multifrequency Radio Interferometry of ESO 137-006 with Information Field Theory. LMU.

David Gorbunov: Density reconstructions using geometric Variational Inference. LMU.

Vishal Johnson: Quantum Mechanics from an Information Theory Perspective. LMU.

Crystal Mele: Multifrequency Radio Imaging of Abell 2256 with Information Field Theory . LMU.

Michael Metz: A Detailed Study of Mass Accretion in Binary Systems and Its Effects on Population Synthesis. TUM.

Andres Ramirez: Cosmic Rays in the Nearby Milky Way. LMU.

3.2 Dissertationen

Abgeschlossen: 12

Felix Ahlborn: Application of turbulent convection theories for stellar structure and evolution models. LMU.

Abhijeet Anand: Probing cool and warm circumgalactic gas in galaxies and clusters with large spectroscopic and imaging surveys. LMU.

Chris Byrohl: Radiative transfer simulations of Lyman-alpha photons in the Universe: Application to cosmology and astrophysics. LMU.

Constantina Fotopoulou: The multi-phase interstellar medium in a high resolution simulation of a dwarf starburst. LMU.

Ilkham Galiullin: X-ray emission from accreting white dwarfs and X-ray binaries. LMU.

Jessica Hislop: Stellar clustering and outflows in dwarf galaxies. LMU

Simon Huber: Strongly Lensed Type Ia Supernovae: Time Delays from Machine Learning. LMU (submitted)

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

Simon May: Structure formation in quantum-wave dark matter cosmologies. LMU.

Periklis Okalidis: Radial transport of stars and gas in the plane of disc galaxies. LMU.

Francesco Rizzuto: Collisions in compact star clusters and formation of massive black holes. LMU.

Stefan Schuldt: Machine learning strong lensing. TUM.

4 Veröffentlichungen

4.1 In Zeitschriften und Büchern

Abdalla, E., Ferreira, E. G. M., Landim, R. G., Costa, A. A., et al., “The BINGO project - I. Baryon acoustic oscillations from integrated neutral gas observations,” *Astronomy and Astrophysics* 664, A14 (2022).

Abdalla, F. B., Marins, A., Motta, P., . . . , Ferreira, E. G. M., et al., “The BINGO Project - III. Optical design and optimization of the focal plane,” *Astronomy and Astrophysics* 664, A16 (2022).

Abdurro’uf, Accetta, K., Aerts, C., . . . , Schaefer, A. L., . . . , Weiss, A., et al., “The Seventeenth Data Release of the Sloan Digital Sky Surveys: Complete release of MaNGA, MaStar, and APOGEE-2 data,” *The Astrophysical Journal* 959 (2), 35 (2022).

Abuter, R., . . . , Arras, P., . . . , Enßlin, T., . . . , Stadler, J., et al., “Deep images of the Galactic center with GRAVITY,” *Astronomy and Astrophysics* 657, A82 (2022).

Abuter, R., Allouche, F., Amorim, A., . . . , Stadler, J., et al., “First light for GRAVITY Wide Large separation fringe tracking for the Very Large Telescope Interferometer,” *Astronomy and Astrophysics* 665, A75 (2022).

Acebron, A., Grillo, C., Bergamini, P., Caminha, G. B., et al., “New strong lensing modeling of SDSS J2222+2745 enhanced with VLT/MUSE spectroscopy,” *Astronomy and Astrophysics* 668, A142 (2022).

Acebron, A., Grillo, C., Bergamini, P., . . . , Bartosch Caminha, G., et al., “VLT/MUSE observations of SDSS J1029+2623: Toward a high-precision strong lensing model,” *The Astrophysical Journal* 926 (1), 86 (2022).

- Acharya, A., Khaire, V., “How robust are the inferred density and metallicity of the circumgalactic medium?,” *Monthly Notices of the Royal Astronomical Society* 509 (4), 5559-5576 (2022).
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- Ahlborn, F., Kupka, F., Weiss, A., Flaskamp, M., “Stellar evolution models with overshooting based on 3-equation non-local theories - I. Physical basis and the computation of the dissipation rate,” *Astronomy and Astrophysics* 667, A97 (2022).
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- Althaus, L. G., Camisassa, M. E., Torres, S., Battich, T., et al., “Structure and evolution of ultra-massive white dwarfs in general relativity,” *Astronomy and Astrophysics* 668, A58 (2022).
- Anand, A., Kauffmann, G., Nelson, D., “Cool circumgalactic gas in galaxy clusters: connecting the DESI legacy imaging survey and SDSS DR16 Mg II absorbers,” *Monthly Notices of the Royal Astronomical Society* 513 (3), 3210-3227 (2022).
- Angelinelli, M., Ettori, S., Dolag, K., Vazza, F., Ragagnin, A., “Mapping ‘out-of-the-box’ the properties of the baryons in massive halos,” *Astronomy and Astrophysics* 663, L6 (2022).
- Angelinelli, M., Ettori, S., Dolag, K., Vazza, F., Ragagnin, A., “Galaxies in the central regions of simulated galaxy clusters,” *Astronomy and Astrophysics* 665, A16 (2022).
- Aouad, C. J., Mazzali, P. A., Hachinger, S., Teffs, J., et al., “Abundance stratification in Type Ia supernovae - VI. The peculiar slow decliner SN 1999aa,” *Monthly Notices of the Royal Astronomical Society* 509 (4), 4445-4463 (2022).
- Arras, P., Frank, P., Haim, P., Knollmüller, J., Leike, R., Reinecke, M., Enßlin, T., “Variable structures in M87(star) from space, time and frequency resolved interferometry,” *Nature astronomy* 2022 (2022).
- Arrigoni Battaia, F., Chen, C.-C., Baobab Liu, H.-Y., . . . , Farina, E. P., et al., “A multiwavelength study of ELAN environments (AMUSE2) - Mass budget, satellites spin alignment, and gas infall in a massive $z \sim 3$ quasar host halo,” *The Astrophysical Journal* 930 (1), 72 (2022).
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- Beccari, G., Boffin, H. M. J., Andreani, P., de Mink, S., et al., “The Present and Future of Astronomy (ASTRO2022),” *The Messenger* 187, 33-35 (2022).
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- Beloborodov, A. M., “Scattering of ultrastrong electromagnetic waves by magnetized particles,” *Physical Review Letters* 128 (25), 255003 (2022).

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- Belvedersky, M. I., Meshcheryakov, A. V., Medvedev, P. S., Gilfanov, M. R., “SRGz: Building an optical cross-match model for the X-ray SRG/eROSITA sources using the Lockman Hole data,” *Astronomy Letters - a Journal of Astronomy and Space Astrophysics* 48 (2), 109-125 (2022).
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- Bhagwat, A., Ciardi, B., Zackrisson, E., Schaye, J., “Cospatial 21 cm and metal-line absorbers in the epoch of reionization - I. Incidence and observability,” *Monthly Notices of the Royal Astronomical Society* 517 (2), 2331-2342 (2022).
- Bikmaev, F., Kolbin, A. I., . . . , Gilfanov, M. R., . . . , Sunyaev, R. A., et al., “SRGe J214919.3+673634—a candidate for AM Her variables discovered by the eROSITA telescope onboard the Spectrum–Roentgen–Gamma orbital observatory,” *Astronomy Letters-a Journal of Astronomy and Space Astrophysics* 48 (9), 530-541 (2022).
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- Brian, W., Coe, D., Diego, J. M., . . . , de Mink, S. E., et al., “A highly magnified star at redshift 6.2,” *Nature* 603, 815-818 (2022).
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- Burenin, R. A., . . . , Gilfanov, M. R., . . . , Sunyaev, R. A., Churazov, E. M., “Observations of massive galaxy clusters from the All-Sky Survey with the eROSITA telescope onboard the SRG space observatory,” *Astronomy Letters-a Journal of Astronomy and Space Astrophysics* 48 (12), 702-723 (2022).
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- Bykov, S. D., Gilfanov, M. R., Tsygankov, S. S., Filippova, E. V., “ULX pulsar Swift J0243.6+6124 observations with NuSTAR: dominance of reflected emission in the super-Eddington state,” *Monthly Notices of the Royal Astronomical Society* 516 (2), 1601-1611 (2022).
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4.2 Populaerwissenschaftliche und sonstige Veröffentlichungen

Nach der Aufhebung der COVID-Beschränkungen im Jahr 2022 hat MPA seine Outreach-Aktivitäten vor Ort schrittweise wieder aufgenommen. Insbesondere die Planetariumsshows begannen im April mit einer Show für ukrainische Flüchtlingskinder. Insgesamt zehn Gruppen – hauptsächlich Schüler und Studenten – begaben sich im digitalen Planetarium des MPA auf eine Reise durch das Universum. Da mehrere Moderatoren während der Pandemie das Unternehmen verlassen, müssen neue MPA-Mitglieder darin geschult werden, das Planetarium zu bedienen, die Show zu aktualisieren und den Besuchern zu präsentieren. MPA-Wissenschaftler hielten auch eine Reihe von (Online-)Vorträgen innerhalb und außerhalb des Instituts für eine breitere Öffentlichkeit, z. im Rahmen von Café und Kosmos, einer gemeinsam mit dem Exzellenzcluster Universe, ESO, MPE und MPP organisierten Veranstaltungsreihe. Zu den weiteren Tätigkeiten gehörte die Betreuung mehrerer Studierender, die im Rahmen von Praktika an kleineren Forschungsprojekten arbeiteten. Die monatliche Highlight-Reihe wurde auch während der Pandemie fortgesetzt, um die breite wissenschaftliche Forschung des Instituts zu präsentieren. Über wichtige wissenschaftliche Ergebnisse wurden Pressemitteilungen herausgegeben und auf unseren Webseiten veröffentlicht (<https://www.mpa-garching.mpg.de/PressReleases>), und MPA-Wissenschaftler fungierten als Interviewpartner für Presse-, Fernseh- und Radiojournalisten.

4.3 Populaerwissenschaftliche Sendungen

RND Wissen - Was war vor dem Urknall? - mit Fabian Schmidt, RND, 18.04.2022
 BBC - Science's Greatest Mysteries: The Age of the Universe - with Sherry Suyu Episode 3

5 Lehrtaetigkeit und Gremientaetigkeit

5.1 Lehrtaetigkeiten: Vorlesungen

T. Battich Invited Lecture at the Sub-Saharan Africa Astronomy Summer School, Stellar Pulsations: linear theory and excitation mechanisms. (Entebbe, Uganda, 19.9.-30.9.)
 E. P. Bellinger: MESA Summer School at UC Santa Barbara (Santa Barbara, CA, USA, 8.8-12.8)
 T. A. Enßlin, WS 2022, LMU München: Information theory (1/3 semester)
 T. A. Enßlin, WS 2022, LMU München: Information field theory (2/3 semester)
 T.A. Enßlin: (LMU München, Garching, 19.9.-23.9.): Signal reconstruction with Python, (key qualification course)
 T.A. Enßlin: (LMU München, Garching, 13.10.-14.10.): Artificial Intelligence, Bayes, & Cognition (seminar)
 E. Garaldi (co-lecturer), Computational Astrophysics, 2022 North-west University, South Africa
 W. Hillebrandt, WS 2021/22 and WS 2022/23, Technische Universität München
 H.-Thomas Janka, WS 2021/2022 and SS 2022, TU München: Lecture series on Cosmic structure formation at the PhD Astroparticle Physics School in Erlangen, Germany (5th – 7th Oct 2022)
 A. Melo Melo: FOPRA Experiment 85: Course 0000100085 in WS 2022/3, TUM, München
 S. H. Suyu, WS2021/2022, TUM, München
 S. H. Suyu, SS2022, TUM, München
 S. H. Suyu, WS2022/2023, TUM, München
 A. Weiss, SS 2020 LMU München

5.2 Gremientaetigkeit

F. Arrigoni Battaia: Committee Member, MPA Kippenhahn award
 F. Arrigoni Battaia: Expert External Reviewer, Panel for HST Large Programmes
 F. Arrigoni Battaia: Reviewer, Chilean FONDECYT Regular projects
 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: Prisma-Strategiegespräch – Themengebiet „Universum“ of BMBF
 H.-Th. Janka: Advisory Panel of “Sterne und Weltraum”
 H.-Th. Janka: Editorial Board of the “Journal of Cosmology and Astroparticle Physics (JCAP)”
 E. Komatsu: ArXiv Scientific Advisory Board
 E. Komatsu: Selection Committee for the Shaw Prize
 A. Weiss: representative of MPA in the SDSS Collaboration Council (CoCo)

5.3 Kolloquiumsvortraege

E. P. Bellinger: Institute of Physics, Czech Academy of Sciences (Prague, Czechia, May 2022)
 D. A. Bollimpalli, AstroCoffee seminar, Institute for Theoretical Physics at Goethe University, (Frankfurt, Germany, November 2022)
 D. A. Bollimpalli, Astrophysics Colloquium, University of Tübingen, (Tübingen, Germany, July 2022)
 D. A. Bollimpalli, Seminar at Institute of Physics, Silesian University, (Opava, Czech Republic, May 2022)
 J.D. Burger, MPA colloquium, November 2022
 J.D. Burger, Munich dark matter meeting, November 2022
 R. Canameras: Laboratoire J-L Lagrange (Nice, France, March 2022)
 R. Canameras: Seminars of the Pole Machine Learning and Deep Learning, Laboratoire d’Astrophysique de Marseille (Marseille, France, April 2022)
 M. Chruslinska: CIERA/Northwestern University, Chicago, IL, US, July 2022
 B. Ciardi: Sapienza (Rome, Italy, March 2022)
 T.Costa: 1. Observatoire de Paris Meudon (03.02)
 T.Costa:CEA Paris Saclay (04.02)
 T.Costa: Institut d’Astrophysique de Paris (10.02)
 T.Costa: LAM Marseille (02.02)
 T.Costa: IRAP Toulouse (17.02)
 T.Costa: Strasbourg Astronomical Observatory (28.01)
 T.Costa: University of Bologna (10.11)
 T.Costa: Osservatorio Astronomico di Trieste (16.11)
 T.Costa: TIFR, Tata Institute of Fundamental Research (28.10)
 G. Csörnyei: MPA SESTAS Seminar (Garching, 13.07.)
 S. de Mink: Joint Astrophysics Colloquium, Munich (November 3, 2022)
 S. de Mink: Invited Talk, Royal Dutch Academy of Sciences (October 13, 2022)
 T. A. Enßlin: MINERVA – Machine Learning for Radioastronomy at Observatoire de Paris (Paris, France, 25.1.)
 T. A. Enßlin: Runde der Biometriebeauftragten (remote, 16.3.)
 T. A. Enßlin: Black Hole Initiative (Harvard University, Cambridge, USA, 7.11.)
 T. A. Enßlin: MIT Haystack Observatory (Westford, Massachusetts, USA, 10.11.)
 R. Farmer: Center for Computational Astrophysics (New York, USA, 6. 04)
 E. Garaldi, Center for Astrophysics (Harvard, U.S.A, 15.9.2022)
 E. Garaldi, Nagoya University (Nagoya, Japan, 6.7.22)
 E. Garaldi, Waseda University (Tokyo, Japan, 12.7.22)
 A. Genina: Max Planck Institute for Nuclear Physics, (Heidelberg, Germany, 05.5)

- M. Gronke: Shanghai Observatory (remote)
M. Gronke: MPA Institute Seminar
M. Gronke: SAAO (remote)
M. Gronke: Institute for Theoretical astrophysics (Oslo)
M. Gronke: LMU (München)
H.-Th. Janka: Arizona State University (Mesa, Arizona, 20.4.; Zoom)
H.-Th. Janka: Universität Freiburg (Freiburg, Germany, 19.1.; Zoom)
H.-Th. Janka: Institut d'Astrophysique de Paris (Paris, France, 16.12.; Zoom)
H.-Th. Janka: University Stockholm (Stockholm, Sweden, 22.11.; Zoom)
H.-Th. Janka: University of Surrey (Guildford, UK, 24.3.; Zoom)
H.-Th. Janka: Tel Aviv University (Tel Aviv, Israel, 6.3.; Zoom)
E. Komatsu: Leung Center for Cosmology and Particle Astrophysics (Taipei, Taiwan, 24.1.)
E. Komatsu: The Galileo Galilei Institute for Theoretical Physics (2.2.)
E. Komatsu: Institut d'Astrophysique de Paris (Paris, France, 11.2.)
E. Komatsu: Columbia University (New York, USA, 1.3.)
E. Komatsu: University of Tokyo (Tokyo, Japan, 13.6.)
L. Lucie-Smith: University of Barcelona, Spain. Institute seminar, September 2022.
L. Lucie-Smith: Physics Meets Machine Learning seminar series, (virtual) July 2022.
L. Lucie-Smith: University of Louvain-la-Neuve, Belgium. Astrophysics Semina, May 2022.
L. Lucie-Smith: The Max Planck Institute for Physics, Germany. The Astroparticle physics seminar, March 2022.
C. O'Riordan: Origins Data Science Workshop, Garching, Germany 25.1.22
C O'Riordan: Nature of DM on Small Scales Meeting, Remote, 30.6.22
C O'Riordan: Munich DM Meeting, Garching, Germany, 6.12.22
R. Pakmor: Institute of Theoretical Astrophysics, University of Oslo (Oslo, Norway, 31.8.)
D. Powell: News from the Dark 7, Montpellier, France, June 2022
D. Powell: MPA Institute Seminar, March 2022
D. Powell: VLBI in the SKA Era, Australia (virtual), Feb. 2022
D. Powell: Lensing Seminar, Uni. Heidelberg, Heidelberg, Germany, Feb. 2022
F. Schmidt: University of Zurich, October 28, 2022
V. Springel: Invited Colloquium (CERN, Geneva, Switzerland, 24.3.)
S. H. Suyu: Physics Colloquium, Physics Institute of the Universidad Nacional Autónoma de México (online, 2.2.)
S. H. Suyu: Colloquium, Polish Academy of Sciences, Poland (online, 1.3.)
S. H. Suyu: Colloquium, South-Western Institute For Astronomy Research, Yunnan University, China (online, 17.3.)
S. H. Suyu: Physics Colloquium, Ben-Gurion University, Israel (online, 16.5.)
S. H. Suyu: Joint Astrophysical Colloquium, Bologna University / INAF-Osservatorio di Astrofisica e Scienza dello Spazio / INAF-Istituto di Radioastronomia (Bologna, Italy, 8.6.)
S. H. Suyu: Colloquium, School of Physics, University of New South Wales (Sydney, Australia, 15.9)
S. H. Suyu: Colloquium, Kavli Institute for the Physics and Mathematics of the Universe, Japan (online, 14.12)
S. H. Suyu: Munich Astrophysics Colloquium, ESO/MPA/MPE/USM (Munich, Germany, 15.12)
S. Vegetti: Japan-Germany join seminar on cosmology and particle physics (Remote, 22.06)
S. Vegetti: CPTS meeting (Berlin, Germany, 19.10)
S. Vegetti: LMU colloquium (Munich, Germany, 16.11)
C. Wang: Max Planck Institute for Astrophysics, (Garching, Germany, 21.02.2022)
C. Wang: School of Astronomy and Space Science at Nanjing University, (Nanjing, China, 02.03.2022)
C. Wang: IAUS 361, (Ballyconnell, Ireland, 10.05.2022)
C. Wang: Munich Institute for Astro-, Particle and BioPhysics, (Garching, Germany, 04.11.2022)
C. Wang: IAU workshop for active B stars (online), (Garching, Germany, 16.11.2022)

5.4 Eingeladener Review Vorträge

- F. Arrigoni Battaia: Multi-phase, Multi-temperature and Complex: how AGN feedback shapes the nature of the circum-galactic and halo gas in galaxy groups (Garching, Germany, 6.-9.12.)
- E. P. Bellinger: TASC6/KASC13: Stellar models for asteroseismology with MESA and GYRE (Leuven, Belgium, 12.7)
- B. Ciardi: Reionization on a Blackboard (New York City, USA, 19.-11.09.)
- T. Costa: COSPAR Meeting 2022 (19.07, Athens, Greece)
- T. Costa: What drives the growth of black holes? (30.09, Reykjavik, Iceland)
- T. Costa: Multi-phase, multi-temperature and complex (09.12, ESO, Garching, Munich)
- S. de Mink: Invited Review Massive Star IAU Symposium Ireland (May 9-12, 2022)
- T. A. Enßlin: Simulation-based inference & probabilistic programming (Vancouver, 13.-16.6.)
- T. A. Enßlin: MAXENT2022: Bayesian and Maximum Entropy methods in Science and Engineering (Paris, 18.-22.7.)
- T. A. Enßlin: Science From Space (Bonn, 27.-28.9.)
- T. A. Enßlin: iid2022: Statistical Methods for Event Data (Lake Guntersville, 15.-18.11.): Illuminating the Dynamic Universe
- R. Farmer: American Physical Society April meeting: Mind the gap: What can GW190521 tell us about stellar astrophysics? (New York, USA, 9-12. 04)
- M. Gronke: What matters around galaxies? (Champoluc, Italy)
- M. Gronke: 6th ICM Theory & Computation Workshop (Copenhagen, remote)
- M. Gronke: In Situ View of Galaxy Formation 2 (Ringberg)
- M. Gronke: NAM (Warwick)
- M. Gronke: Multiphase solar to ICM (Orleans, remote)
- H.-Th. Janka: Astrophysics from Ground to Space, AG Herbsttagung (Bremen, Germany, 12.-16.9.)
- H.-Th. Janka: ELEMENTS Annual Conference (Frankfurt, Germany, 3.-5.5.)
- H.-Th. Janka: Current Topics in Astroparticle Physics (Munich, Germany, 9.-11.11.)
- E. Komatsu: Inaugural conference of the Illinois Center for Advanced Studies of the Universe (Urbana-Champaign, Illinois, USA, 19.-21.5.)
- E. Komatsu: Gravity -The Next Generation- (Kyoto, Japan, 14.-18.2.)
- L. Lucie-Smith: Fundamental Cosmology Meeting, invited review talk on machine learning and neural networks (Instituto de Astrofísica de Andalucía, Granada, Spain, November 2022)
- C. O’Riordan: Substructure detection with machine learning (IFT, Madrid, 14.6-16.6)
- R. Pakmor: Galactic magnetic fields in cosmological simulation (Bochum, Germany, 17.-19.10.)
- R. Pakmor: Type Ia Supernova progenitors (Santa Barbara, USA, 14.-16.11.)
- F. Schmidt: Rencontres de Moriond on Cosmology (La Thuile, IT, January 23-30, 2022)
- F. Schmidt, A Cosmic Window to Fundamental Physics: Primordial Non-Gaussianity and Beyond, IFT (Madrid, ES, September 19-24, 2022)
- S. Vegetti: New Directions in Radio Astronomy (Bonn, Germany, 11.04-13.04)
- V. Springel: Hot Gas in the Universe (Xiamen, China, 31.3.-2.4.)
- V. Springel: Galaxy Formation and Evolution Across Cosmic Time (Santiniketan, India, 13.12.-14.12.)
- J. Stadler, Observing the Universe in Motion: 5 Years of GRAVITY (Ringberg, Germany, 23.-29.10.2022)
- S. H. Suyu: European Astronomical Society Annual Meeting, Special Session on Mining the sky: searching and modeling strong lenses at galaxy and cluster scales (Valencia, Spain, 27.6-1.7)
- S. H. Suyu: Invited Discourse, XXXIst General Assembly of the International Astronomical Union (Busan, South Korea, 2.-11.8.)

S. H. Suyu: General Assembly of the International Astronomical Union, Focus Meeting on Consensus Cosmic Shear in the 2020s (Busan, South Korea, 2.-11.8.)
S. Vegetti: Line-of-sight effects (Montpellier, France, 8.06-10.06)
S. Vegetti: Galaxy Evolution with Euclid (Remote, 25.10-28.10)

Prof. Dr. Eiichiro Komatsu (Geschäftsführender Direktor)