Garching

Max-Planck-Institut für extraterrestrische Physik

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1 Einleitung

Das Max-Planck-Institut für extraterrestrische Physik (MPE) befaßte sich 2017 mit grundlegenden Themen der Astrophysik, die sich folgenden großen Wissenschaftsbereichen zuordnen lassen: (i) *Astrochemie, Gas und Staubprozesse im Interstellaren Medium*, (ii) *Entstehung von Sternen und Planetensystemen*, (iii) *Kompakte Objekte*, (iv) *Galaktisches Zentrum*, (v) *Aktive Galaxien*, (vi) *Galaxienentstehung und -entwicklung*, (vii) *Galaxienhaufen und Großräumige Struktur*, (viii) *Kosmologie und Dunkle Energie*.

Die wissenschaftlichen Aktivitäten am MPE sind organisatorisch in vier große Arbeitsbereiche aufgeteilt, die jeweils von einem Direktor geleitet werden: (1) Infrarot- und Submm/mm Astronomie (Prof. Dr. Reinhard Genzel), (2) Optische und Interpretative Astronomie (Prof. Dr. Ralf Bender), (3) Hochenergieastrophysik (Prof. Dr. Kirpal Nandra) und (4) Zentrum für Astrochemische Studien (Prof. Dr. Paola Caselli). Diese vier Arbeitsbereiche, sowie noch zusätzlich zwei unabhängige Forschungsgruppen, beschäftigen sich – oft bereichsübergreifend – mit unseren acht großen Forschungsthemen.

Dabei werden überwiegend experimentelle Methoden angewandt, aber auch theoretische Untersuchungen durchgeführt. Der Name des Instituts bezieht sich einerseits auf den Gegenstand der Forschung: die Physik des Weltraums, andererseits auf die Forschungsmethoden: viele unserer Experimente werden notwendigerweise oberhalb der dichten, absorbierenden Erdatmosphäre mit Flugzeugen, Satelliten und Raumsonden durchgeführt. In zunehmendem Maße setzen wir aber, vor allem im optischen, im Infrarotbereich und in der Astrochemie, auch Instrumente an erdgebundenen Teleskopen ein.

Methodisch lassen sich die Forschungsaktivitäten des MPE in mehrere Bereiche einteilen. In der beobachtenden Astrophysik werden am MPE innovative Instrumente vollständig oder zum Teil gebaut. Damit wird die Strahlung entfernter Objekte in den Millimeter/Submillimeter-, Infrarot-, Optischen-, Röntgen- und Gammaspektralbereichen gemessen. Der hierbei überdeckte Teil des elektromagnetischen Spektrums umfasst mehr als zwölf Dekaden. Die untersuchten Objekte reichen von nahen Kometen bis zu den fernsten Quasaren, von winzigen Neutronensternen bis zu Galaxienhaufen, den größten bekannten Formationen im Kosmos. Theoretische Arbeiten liefern die Grundlagen zum Verständnis und Interpretation der Beobachtungen und Messungen. Die direkte Wechselwirkung von Beobachtern, Experimentatoren und Theoretikern im Hause ist ein Merkmal unseres Arbeitsstils und führt oft im direkten Wechselspiel von Hypothesen und Beobachtungstatsachen zu einem frühen Erkennen von Zusammenhängen und damit zu einer frühzeitigen Identifikation vielversprechender neuer Forschungsrichtungen. Ergänzt werden unsere Forschungsaktivitäten durch

Experimente im Labor, mit denen sowohl die aus Theorie und Beobachtungen gewonnenen Ergebnisse überprüft als auch Informationen und Erkenntnisse gewonnen werden, die wiederum in theoretische Modelle und die Dateninterpretation einfliessen.

Eine externe technologische Einrichtung des MPE ist von besonderer Bedeutung: Die 130 m lange Vakuumanlage *Panter* zum Test von Röntgenteleskopen in Neuried bei München. Fast alle röntgenastronomischen Experimente oder Teile davon wurden in dieser Anlage getestet. Unter anderem durch diese Einrichtung findet ein Transfer von neuen Verfahren und Methoden in die industrielle Anwendung statt. Im Rahmen unserer Transferaktivitäten hielt das MPE 10 Patente am Ende von 2017.

Neben der Forschung nimmt unser Institut auch universitäre Ausbildungsaufgaben wahr. Mehr als zehn MPE-Wissenschaftler sind als Hochschullehrer an zahlreichen Universitäten tätig und betreuen studentische Forschungsarbeiten, wie z.B. Bachelor-, Master- und Doktorarbeiten. Die Mehrzahl davon an den beiden Münchner Universitäten, aber auch an anderen deutschen Hochschulen und im Ausland. Darüber hinaus veranstalten wir spezielle Seminare und Symposien zu den im Institut behandelten Forschungsgebieten, häufig in Zusammenarbeit mit Universitätsinstituten. Unsere sehr erfolgreiche „International Max-Planck Research School (IMPRS) on Astrophysics“ an der Ludwig-Maximilians-Universität (LMU) München brachte eine wesentliche Intensivierung der Doktorandenausbildung im Raum Garching/München. An dieser im Jahre 2000 gegründeten „Graduate School“ sind neben unserem Institut und dem Max-Planck-Institut für Astrophysik (MPA) noch das Institut für Astronomie und Astrophysik der LMU und die Europäische Südsternwarte beteiligt. Mit typisch 80 Doktoranden in diesem Programm, wovon etwa 30 am MPE arbeiten, gehört die IMPRS on Astrophysics zu den größten Einrichtungen dieser Art weltweit.

Das MPE präsentiert seine Arbeit und die Ergebnisse seiner Forschung einem breiten Publikum. Regelmäßige Meldungen über die Wissenschaft, Projekte und Menschen am Institut werden ergänzt durch eine Vielzahl an Veranstaltungen sowohl im Hause als auch außerhalb, wie Führungen für Gruppen (meist Schulklassen), Teilnahme am jährlichen „Girls' Day“, dem zweijährig stattfindenden „Tag der offenen Tür“ sowie der Anleitung von Schüler- und Hochschulpraktikanten. Darüber hinaus halten MPE Wissenschaftler regelmäßig populär-wissenschaftliche Vorträge außer Haus.

2 Personal und Ausstattung

2.1 Personalstand

Direktoren:

Prof. Dr. K. Nandra, (Geschäftsführung) Hochenergie-Astrophysik; Prof. Dr. R. Bender, Optische und Interpretative Astronomie; Prof. Dr. P. Caselli, Zentrum für Astrochemische Studien; Prof. Dr. R. Genzel, Infrarot- und Submillimeter-Astronomie; Prof. Dr. G. Haerendel (emeritiert); Prof. Dr. R. Lüst (emeritiert); Prof. Dr. G. Morfill (emeritiert); Prof. Dr. K. Pinkau (emeritiert); Prof. Dr. J. Trümper (emeritiert).

Auswärtige wissenschaftliche Mitglieder:

Prof. Dr. E. van Dishoeck (Universität Leiden, Niederlande); Prof. Dr. V. Fortov (IHED, Moskau, Russland); Prof. Dr. J. Kormendy (University of Texas at Austin, USA); Prof. Dr. R. Z. Sagdeev (University of Maryland, College Park, USA); Prof. Dr. M. Schmidt (CALTECH, Pasadena, USA); Dr. Karl Schuster (IRAM, Grenoble, Frankreich); Prof. Dr. Y. Tanaka (JSPS, Bonn; MPE, Deutschland).

Fachbeirat:

Prof. Dr. J. Bergeron (Institute d'Astrophysique de Paris, Frankreich); Prof. Dr. M. Colless (Australian Astronomical Observatory, Australien); Prof. Dr. N. Evans (University of Texas at Austin, USA); Prof. Dr. K. Freeman (Mt. Stromlo Observatory, Australien); Dr. N. Gehrels (NASA/GSFC, Greenbelt, USA); Prof. Dr. F. Harrison (CALTECH, USA); Prof.

Dr. R. Kennicutt (University of Cambridge, UK); Prof. Dr. E. Quataert (University of California Berkeley, USA); Prof. Dr. G. Stacey (Cornell University, USA).

Fachübergreifende Fachbeiräte:

Prof. Dr. G. Anton (Universität Erlangen-Nürnberg, Deutschland); Prof. Dr. M. Perryman (ESA/ESTEC, Niederlande).

Kuratorium:

Prof. Dr. A. Bode (Leibniz-Rechenzentrum der Bayerischen Akademie der Wissenschaften, Garching); Dr. R. Breuer (ehemaliger Chefredakteur Spektrum der Wissenschaft, Heidelberg); Dr. G. Gruppe (Deutsches Zentrum für Luft- und Raumfahrt, Bonn); MdB F. Hahn (Deutscher Bundestag, Berlin); Prof. Dr. B. Huber (Präsident der LMU München, München); Dr. F. Merkle (OHB System AG, Bremen); MinR. Dr. R. Mertz (Bayerisches Staatsministerium für Wirtschaft und Medien, Energie und Technologie, München); Dr. U. von Rauchhaupt (Frankfurter Allgemeine Zeitung, Frankfurt/Main); Prof. R. Rodenstock (Optische Werke G. Rodenstock GmbH & Co. KG, München); Dr. J. Rubner (Bayerischer Rundfunk, München); MdB B. Zypries (Bundesministerium für Wirtschaft und Energie, Berlin).

Wissenschaftliche Mitarbeiter und Angestellte

A. Infrarot-und Sub-mm-Astronomie

Dr. M. Bauböck, Dr. S. Belli, Dr. A. Cortes, Dr. A. Contursi, Dr. R. Davies, Dr. C. Deen, S. Dengler, Dr. J. Dexter, Dr. F. Eisenhauer, Dr. S. Faccini, Dipl.-Phys. H. Feuchtgruber, Dr. N. Förster Schreiber, Dr. N. Gao, Dr. V. Garrel, Dr. S. Gillessen, Dr. M. Habibi, Dr. M. Hartl, S. Harai-Ströbl, Dr. R. Herrera-Camus, A. Kleiser, Dr. D. Lutz, Dr. E. Nelson, Dr. T. Ott, Dr. O. Pfuhl, Dr. A. Poglitsch, Dr. S. Price, Dr. S. Rabien, A. Richter, Dr. M. Rosensteiner, Dr. A. Schruba, Dr. T. Shimizu, Dr. E. Sturm, Dr. L. Tacconi, Dr. K. Tadaki, Dr. E. Wisnioski, Dr. E. Wuyts, Dipl.-Phys. S. Yazici, J. Zanker-Smith.

Doktoranden (D)/Master (M):

P. Cazzoletti (D.), S. von Fellenberg (D.), A. Janssen (D.), A. Jimenez Rosales (D.), M. Karl (M.), M.-Y. Lin (D.), M. Lippa (D.), P. Plewa (D.), R. Stock (M.), H. Übler (D.), I. Waisberg (D.), F. Widmann (D.), R. Worth-Davies (D.).

B. Hochenergie-Astrophysik

Dr. R. Andritschke, A. Bähr, Prof. Dr. W. Becker, Dr. D. Begue, Dr. A. Behrens, B. Boller, Prof. Dr. T. Boller, M. Bonholzer, Dr. H. Bräuninger, Dr. H. Brunner, Dr. M.J. Burgess, Dr. W. Burkert, A. Buron, Dr. V. Burwitz, Dr. S. Carpano, Dr. J. Chen, Dr. J. Chichuan, Dr. W. Collmar, Dr. B. De Marco, Dr. A. Del Moro, Dr. K. Dennerl, Prof. Dr. R. Diehl, Dr. T. Dwelly, Dr. D. Eckert, Dipl.-Ing. J. Eder, V. Emberger, Dr. T. Eraerds, Dr. G. Erfanianfar, W. Frankenhuizen, Dr. M. Freyberg, Dr. P. Friedrich, Dr. M. Fürmetz, R. Gaida, Dr. E. Gardner, Dr. A. Georgakakis, Dr. J. Graham, Dr. J. Greiner, Dr. C. Grossberger, Dr. A. Gueguen, Dr. F. Haberl, S. Hartl, K. Hartmann, Dipl.-Math. G. Hartner, G. Hauser, Dr. F. Hofmann, Dr. A. von Kienlin, Dr. M. Klein, Dr. T. Kruehler, A. Koch, M.M. La Caria, Dr. C. Maitra, K. März, Dr. N. Meidinger, Dr. A. Merloni, S. Obergassl, S. Ott, C. Pelliciary, Dipl.-Phys. E. Pfeffermann, Dr. G. Ponti, Dr. P. Predehl, Dr. L. Proserpio, Dr. A. Rau, J. Reiffers, Dr. J. Sanders, Dr. S. Scaringi, Dr. P. Schady, T. Schweyer, V. Stehlikova, Dr. L. Teng, J. Tran, Dr. W. Treberspurg, A. Tüchler, Dr. R. Yates, Dr. X.-L. Zhang.

Doktoranden (D)/Master (M):

S. Argawal (D.), R. Arcodia (D.), L. Baronchelli (D.), L. Bauer (M.), J. Bodensteiner (M.), J. Bolmer (M.), E. Breunig (M.), I.J. Chitham (D.), D. Coffey (D.), C. Delvaux (D.), M. Ghaempanah (D.), F. Käfer (D.), F. Knust (D.), D. Kroell (D.), E. Madarz (M.), A. Malyali (D.), G. Mantovani (D.), B. Menz (D.), J. Müller-Seidlitz (D.), M. Pleintinger (M.), T. Schweyer (M.), T. Simm (D.), M. Tanga (D.), K. Toelge (M.), K. Varela (D.), G. Vasilopoulos (D.), P. Wiseman (D.), H.-F. Yu (D.).

C. Optische und Interpretative Astronomie

Dr. A. Beifiori, Dr. A. Bode, Dr. C. Bodendorf, Prof. Dr. H. Böhringer, Dipl.-Phys. A. Bohnet, Dr. A. Brucalassi, Dr. M. Fabricius, Dr. D. Farrow, Dr. M. Fossati, Dr. A. Galametz, Dr. N. Geis, Prof. Dr. O. Gerhard, Dr. J. Gracia Carpio, Dr. F. Grupp, I. Hartung, Dr. U. Hopp, Dr. B. Hoyle, C. Ingram, Dipl.-Ing. J. Kaminski, Dr. R. Katterloher, Dr. X. Mazzalay, Dr. T. Mendel, Dr. A. Monna, Dr. F. Montesano, B. Niebisch, Dr. C. Obermeier, Dr. M. Optisch, M.Sc. D. Penka, Dr. A. Perez-Villegas, A. Piemonte, Dr. F. Raison, Dr. R. Saglia, Dr. A. Sanchez, Dr. J. Snigula, Dr. J. Thomas, Dr. C. Wegg, I. Weiss. Prof. Dr. J. Weller, Dr. M. Wetzstein, Dipl.-Ing. C. Wimmer.

Doktoranden (D)/Master (M):

A. Arth (D.), R. Bolze (M.), M. Blana Diaz (D.), F. Clarke (D.), V. Fahrenschon D.), F. Finozzi (D.), J. Grieb (D.), M. Häuser (D.), J. Hou (D.), H. Kellermann (D.), M. Kluge (D.), M. Kodric (D.), M. Lippich (D.), C. Pulsoni (D.), I. Söldner-Rembold (D.), T. Varga (D.), S. Wylie (D.).

D. Zentrum für Astrochemische Studien

Dr. V. Ali-Lagoa, Dr. G. Bano Esplugus, Dr. L. Bizzocchi, Dr. R. Choudhury, Dr. F. de Oliveira Alves, Dr. M. Gong, Dr. M. Egner Goto, Dr. C. Endres, Dr. E. Etim, Dr. S. Feng, Dr. B.M. Giuliano, Dr. S. Hocuk, Dr. A. Ivlev, Dr. K. Silsbee, Dr. J. Laas, Dr. V. Lattanzi, Dipl.-Ing. P. Maier, Dr. A. Mullins, Dr. T. Müller, Dr. Z. Nagy, Dr. J. Pineda Fornerod, Dr. B. Riaz, Dr. A. Schmiedeke, Dr. D. Segura-Cox, Dr. O. Sipilä, Dr. S. Spezzano, Dr. L. Szücs, Dr. W. Thi, Dr. A. Vasyunin, Dr. B. Zhao.

Doktoranden (D)/Master (M):

C. Agurto Ganges (D.), A. Barnes (D.) A. Chacon Tanarro (D.), J. Chantzos (D.), B. Müller (D.), A. Punanova (D.), D. Prudenzano (D.), E. Redaelli (D.), Sokolov (D.).

E. Unabhängige Forschungsgruppen

a) Forschungsgruppe Prof. Dr. A. Burkert

Prof. Dr. A. Burkert, Dr. M. Schartmann.

Doktoranden (D)/Master (M):

M. Behrendt (D.), S. Heigl (D.).

b) Forschungsgruppe Prof. Dr. J. Mohr

Dr. M. Klein, Prof. Dr. J. Mohr.

Doktoranden (D)/Master (M):

S. Grandis (D.), N. Gupta (D.), M. Paulus (D.).

F. Ingenieurbereiche und Werkstätten

a) Elektrotechnik

Dipl.-Ing. S. Albrecht,

M. Bachhuber, Dipl.-Ing. (FH) L. Barl, Dipl.-Ing. (FH) W. Bornemann, Dipl.-Ing. (FH) T. Burghardt, M.Sc. A. Buron, H. Cibooglu, D. Coutinho, A. Emslander, M.Sc. M. Gillhuber, R. Gressmann, Dipl.-Ing. (FH) O. Hälker, Dipl.-Ing. (FH) O. Hans, M. Hengmith, Dipl.-Ing. (FH) W. Kink, M.S. A. Koch, S. Krämer, P. Langer, M.Sc. A. Lederhuber, M.Sc. C. Mandla, Dipl.-Ing. (FH) S. Müller, F. Oberauer, Dipl.-Ing. (FH) S. Ott, H. Özdemir, Dr. M. Plattner (Leitung), Dipl.-Ing. (FH) C. Rau, Dipl.-Ing. (FH) J. Reiffers, P. Reiss, M. Rupprecht, M. Schneider, F. Schrey, V. Yaroshenko, J. Zanker-Smith, Dipl.-Ing. (FH) J. Ziegleder.

Doktoranden (D)/Master (M):

M. Baade (M.), A. Carvajal (M.), T. Ohlenforst (M.), G. Ott (M.), T. Unterlinner (M.).

b) Mechanik

R. Alhamwi, R. Bayer, T. Blasi, A. Brara, B. Budau, S. Czempiel, C. Deysenroth, M. Deysenroth, Dipl-Ing. (FH) K. Dittrich, J. Eibl, P. Feldmeier, C. Fischer, J. Gahl, Dipl.-Phys. H. Gemperlein, A. Goldbrunner, J. Hartwig, Dipl-Ing. (FH) M. Haug, F. Haußmann, M. Honsberg, D. Huber, F.-X. Huber, Dipl.-Ing. H. Huber, H.-J. Kestler, T. Kratschmann, Dipl-Ing. (FH) B. Mican, Dipl.-Ing. (FH) S. Paßlack, Dipl.-Ing. (FH) A. Pflüger, Dipl.-Ing. (FH) D. Pietschner, M. Plangger, A. Reinold, C. Rohe, R. Sandmair, A. Schneider, C. Schreib, Dr. J. Schubert (Leitung), W. Schunn, D. Schuppe, S. Senftleben, F. Soller, R. Strecker.

Doktoranden (D)/Master (M):

V. Hörmann (M.), K. März (M.), J. Tran (M.).

c) Auszubildende

K. Bergner, C. Fischer, C. Furchtsam, S. Lenzewski, T. Liepold, M. Rusp, F. Waldhör C. Warmuth, J. Ziegmeier.

G. Zentrale DV-Gruppe

Dipl.-Ing. A. Agudo Berbel, H. Baumgartner, Dipl.-Phys. A. Bohnet (Leitung), A. Kleiser, L. Klose, C. Kollmer, A. Oberauer, Dr. T. Ott, J. Paul, Dipl.-Ing. (FH) R. Sigl, Dipl.-Ing. E. Wieprecht, Dipl.-Ing. (FH) E. Wiezorrek.

H. Öffentlichkeitsarbeit

E. Collmar, Dr. W. Collmar, Dr. H. Hämmerle.

I. Publikationsunterstützung

R. Hauner.

J. Bibliothek

C. Bartels, E. Blank.

K. Verwaltung und Allgemeine Dienste

G. Apold, A. Arturo, S. Ayari, T. Bauer, M. Bauernfeind, L. Belscak, U. Cziasto, C. Eicher, M. Ertl, S. Fleischmann, S. Goldbrunner, M. Grasemann, M. Grohmann, H.-P. Gschnell, I. Hartung, S. Hausmann, R. Hidasi, P. Hingerl, T. Jäkel, J. Jirsch, S. Kaps, W. Karing, M. Keil, L. Kestler, A. Krapvina, E. Kuhwald, E. Maier, D. Meindl, A. Nagy, A. Neun, J. Paschou, M. Peischl, C. Preisler, R. Rochner, S. Rosenberger, A. Sacher, P. Sandtner, B. Scheiner, A. Schmidt, S. Schwaiger, B. Seyfarth, R. Steinle, C. Stricker, F. Thiess, L. Thiess, K. Üblacker, J. Uhland, J.P. Vogt.

2.2 Gäste

Im Jahr 2017 besuchten 87 Gastwissenschaftler das MPE, mit Besuchszeiten von einigen Tagen bis zu einigen Monaten.

3 Preise, Auszeichnungen, Berufungen

Bender, R.: Bundesverdienstkreuz, Bundesrepublik Deutschland, München, Deutschland, März 2017

Caselli, P.: Chalmers Jubilee Professorship, Chalmers University of Technology, Göteborg, Schweden, Juni 2017

Gerhard, O.: Brouwer Award, Division of Dynamical Astronomy, American Astronomical Society, London, UK, Juni 2017

Poglitsch, A.: Preis für Instrumentenentwicklung, Astronomische Gesellschaft, Göttingen, Deutschland, September 2017

Trümper, J.: Cothenius-Medaille, Leopoldina (Nationale Akademie der Wissenschaften), Halle, Deutschland, September 2017

4 Lehrtätigkeit, Prüfungen und Gremientätigkeit

4.1 Lehrtätigkeiten

Becker, W.: Astrophysikalisches Doktorandenseminar mit den Studenten der *International Max-Planck Research School (IMPRS) on Astrophysics*, LMU München WS 16/17, SS 17, WS 17/18;

Bender, R.: Astronomisches Kolloquium, LMU München WS 16/17, SS 17, WS 17/18; Astrophysikalisches Grundpraktikum, LMU München WS 16/17, SS 17, WS 17/18; Forschungsprojekt Masterarbeit, Anleitung zum wissenschaftlichen Arbeiten, LMU München WS 16/17, SS 17, WS 17/18; Grundlagen der fortgeschrittenen Astrophysik (Essential of Advanced Astrophysics), LMU München WS 16/17/, SS 17, WS 17/18; Ergänzung zur Vorlesung „Grundlagen der fortgeschrittenen Astrophysik“, LMU München WS 16/17, SS 17, WS 17/18; Astrophysikalisches Hauptseminar theoretisch und numerisch orientiert, „Tools in modern astrophysics“, LMU München WS 16/17, SS 17, WS 17/18; Begleitendes Kolloquium zum Astrophysikalisches Hauptseminar theoretisch und numerisch orientiert, LMU München WS 16/17, SS 17, WS 17/18; Astrophysikalisches Hauptseminar experimentell und beobachtungsorientiert, „Tools in modern astrophysics“, LMU München WS 16/17, SS 17, WS 17/18; Begleitendes Kolloquium zum Astrophysikalisches Hauptseminar experimentell und beobachtungsorientiert, LMU München WS 16/17, SS 17, WS 17/18; Projektseminar mit begleitendem Kolloquium „Extragalactic group seminar“, LMU München SS 17; Projektseminar mit begleitenden Kolloquium „Gravitational lensing“, LMU München WS 16/17, SS 17; Projektseminar mit begleitenden Kolloquium „Galaxies“, LMU München WS 16/17, SS 17, WS 17/18; Projektseminar mit begleitenden Kolloquium aus dem Bereich experimenteller Arbeiten und Instrumentenentwicklung in der Astronomie, LMU München WS 16/17, SS 17, WS 17/18; Projektseminar mit begleitenden Kolloquium, vorbereitendes Kolloquium zur Masterarbeit mit Tutorium, Kolloquium und Tutorium aus dem Bereich der Kosmologie, Anleitung zum Wissenschaftlichen Arbeiten, LMU München WS 16/17, SS 17, WS 17/18; Projektseminar mit begleitenden Kolloquium, vorbereitendes Kolloquium zur Masterarbeit mit Tutorium, Kolloquium und Tutorium aus dem Bereich experimenteller Arbeiten, Anleitung zum wissenschaftlichen Arbeiten, LMU München WS 16/17, SS 17, WS 17/18; Galaxies, Vorlesung, LMU München WS 17/18; Ergänzung zur Vorlesung „Galaxies“, LMU München WS 16/17.

Boller, Th.: AGN Physics, Goethe-Universität Frankfurt WS 16/17. Astronomische Koordinatensysteme, Zeitrechnung, Kalender, Goethe-Universität Frankfurt SS 17; Strahlung und Materie, Goethe-Universität Frankfurt SS 17.

Dexter, J.: The Galactic Center, Universität von Bologna SS 17.

Diehl, R.: Astrophysics Seminar „Nuclei in the Cosmos“, TU München WS 16/17, SS 17, WS 17/18 (mit Dozenten vom MPE, MPA, LMU, TU); Observational Astrophysics, TU München SS 17; Astrophysics with Gamma-Ray Telescopes, Universität von Kyoto SS 17.

Eisenhauer, F.: Einführung in die Astrophysik, TU München WS 16/17, WS 17/18; High Angular Resolution Astronomy: Adaptive Optics and Interferometry, TU München SS 17.

Müller, T.: Astronomie und Kosmologie; Faszination Sonnensystem: (Kleine) Körper, exotische Welten, Planet IX/X, Lehrerakademie Dillingen, WS 16/17.

Saglia, R.: Essential Astrophysics, LMU München SS 17.

5 Wissenschaftliche Arbeiten

Die Wissenschaft und Instrumentenentwicklung der einzelnen Forschungsgruppen (siehe Einleitung) ist ausführlich auf unseren Internetseiten (`http://www.mpe.mpg.de`) unter dem Punkt „Forschung“ dargestellt. Wichtige Einzelergebnisse sind unter „MPE Forschungsmeldungen“ in zeitlicher Reihenfolge beschrieben.

Die wichtigsten Hardware-Projekte in der Infrarot-Astronomie sind derzeit das Interferometer GRAVITY und die Kamera MICADO für das ESO ELT, in der Röntgenastronomie die Satellitenprojekte eROSITA und ATHENA, in der optischen Astronomie die Entwicklung der Optik für das ESA-Weltraumteleskop „Euclid“ und der Bau von modernen Laborspektrographen in der Astrochemie.

6 Akademische Abschlussarbeiten

6.1 Bachelorarbeiten

Abgeschlossen:

Alber, B.: Größenentwicklung von Galaxien. Ludwig-Maximilians-Universität München 2017.

Antonini, E.: Photometrische und spektroskopische Beobachtungen der Sternenpopulationen in Kugelsternhaufen zur Bestimmung von Alter und Metallizität. Ludwig-Maximilians-Universität München 2017.

Bermel, B.: Evolution of redshifted spirals in dark matter halos at $0.7<z<2.7$. Ludwig-Maximilians-Universität München 2017.

Bruhn, S.: Quenching Prozesse in Galaxien und die Schechter Massen Funktion. Ludwig-Maximilians-Universität München 2017.

Yordanova, A.: Die Entstehung der Cores in riesen elliptischen Galaxien. Ludwig-Maximilians-Universität München 2017.

6.2 Masterarbeiten

Abgeschlossen:

Baade, M.B.: Design and Simulation of the Radiator Support Structure for the ATHENA Mission. Technische Universität München 2017

Bauer, L.: Bestimmung der Eigengeschwindigkeit des isolierten Neutronensterns RX J0420.0-5022 mit Chandra. Ludwig- Maximilians-Universität München 2017.

Bodensteiner, J.: Interaction between massive stars and the interstellar medium. Technische Universität München 2017.

Fahrenschon, V.: General relativistic effects in main sequence binary systems. Ludwig-Maximilians-Universität München 2017.

Fellenberg, S. v.: A new far-infrared view into the galactic centre - a detection of Sgr A* in the far infrared. Technische Universität München 2017.

Hörmann, V.H.: Entwicklung eines Kühlkonzeptes für den MICADO Kryostaten. Technische Universität München 2017.

Ohlenforst, T.O.: Development of the Power Conditioning Module for the Wide Field Imager Instrument of ATHENA. Technische Universität München 2017.

6.3 Dissertationen

Abgeschlossen:

Janssen, A.: An infrared/submillimetre perspective on active galactic nuclei. Ludwig-Maximilians-Universität München 2017.

Knust, F.: Applying the fireball model to short gamma-ray burst afterglows: methods, jet opening angles and plateau phases. Technische Universität München 2017.

Lin, M.-Y.: Gas flows and stars in nuclear regions of nearby Seyfert galaxies. Ludwig-Maximilians Universität München 2017.

Punanova, A.: Chemistry and Kinematics in Low-Mass Star-Forming Regions. Ludwig-Maximilians-Universität München 2017.

Varela Cardozo, K.P.: Testing the standard GRB afterglow model with the snapshot method using multi-epoch multi-wavelength data. Technische Universität München 2017.

Wiseman, P.: Gamma-ray burst host galaxies in absorption. Technische Universität München 2017.

7 Tagungen, Projekte am Institut und Beobachtungszeiten

7.1 Tagungen und Veranstaltungen

SDSS-IV/SPIDERS Team Meeting, MPE, Garching, Germany 17.01.-18.01., Organisation: A. Merloni.

The Physics of the ISM. 6 Years of ISM-SPP 1573: What have we learned?, Cologne, Germany, 13.02.-17.02., Organisation: J. Alves, P. Caselli, R. Crutcher, B. Elmegreen, F. Heitsch, M. Krumholz, S. Longmore, J. Stutzki.

Multi-scale star formation, Morelia, Mexico, 03.04.-07.04., Organisation: G. Bruzual, P. Caselli, F. Combes, B. Emegreen, N. Evans, L. Hartmann, M. Hoare, S. Lizano, M. MacLow, F. Motte, C. Munoz Tunon, L.F. Rodriguez, M. Urry, E. Vazquez-Semadeni, Q. Zhang.

SKA-Athena Synergy Workshop, Jodrell Bank, UK, 24.04.-25.04., Organisation: R. Cassano, C. Ferrari, R. Fender, A. Merloni.

Small Bodies Near and Far, Poznan, Poland, 04.05.- 06.05., Organisation: T.G. Müller, A. Marciniak.

eROSITA-LOFAR Workshop, MPE, Garching, Germany, 15.05.-17.05., Organisation: A. Merloni, A. Finoguenov, H. Roettgering.

Advances in galaxy evolution through a new generation of spectroscopic surveys, Ringberg Castle, Germany, 11.06.-16.06., Organisation: R. Bezanson, C. Conroy, N.M. Förster Schreiber, M. Franx, M. Kriek, R. McLure, A. Newman, L. Pentericci, A. van der Wel.

Current and Future Perspectives of Chemical Modelling in Astrophysics, Hamburg, Germany, 17.07.-19.07., Organisation: R. Banerjee, S. Bovino, P. Caselli, D. Galli, T. Grassi, B. Koertgen, D. Seifried, D. Schleicher, W.-F. Thi.

eROSITA_DE Consortium Meeting, Hamburg, Germany, 17.07.-19.07., Organisation: A. Merloni, P. Predehl, J. Robrade, J. Schmitt.

The Galaxy Ecosystem: flow of Baryons through Galaxies, ESO, Garching, Germany, 24.07.-28.07., Organisation: V. Mainieri, P. Popesso, M. Brusa, M. Cirasuolo, A. de Cia, G. de Lucia, K. Dolag, B. Husemann, A. Man, A. Merloni, O. Gerhard, C. Peroux, G. Popping.

Reaching New Heights in Astronomy – Celebrating ESO's achievements and perspectives from 10 years of Tim de Zeeuw as Director General, Garching, Germany, 28.08.-30.8., Organisation: R. Ivison (chair), R. Bacon, M. Kissler-Patig, K. Kuijken, M. Rejkuba, J.-R. Roy, L.J. Tacconi, M.T. Ruiz, J. Walsh.

12th European Planetary Science Congress (EPSC), Session SB12: Small Bodies Near and Far, Riga, Latvia, 17.09.-22.09., Organisation: T.G. Müller, P. Santos-Sanz.

Small Bodies Near and Far, Konkoly Observatory, Budapest, Hungary, 04.10.-06.10., Organisation: T.G. Müller, C. Kiss.

The Physics of Quenching Massive Galaxies at High Redshift, Lorentz Center, Leiden, The Netherlands, 06.11.-10.11., Organisation: S. Belli, I. Labbé, A. Man, T. Naab, K. Rowlands.

7.2 Projekte und Kooperationen mit anderen Instituten

Australien

Australian National University, Canberra: Galaxienentstehung.

CSIRO Astronomy and Space Science, Epping: CAS-Beobachtungen, CAS-Theorie.

Monash University, Melbourne: Nukleare Astrophysik.

Swinburne University of Technology, Victoria: Millisecond Pulsars.

University of Western Sydney: Magellanic Clouds.

Belgien

CSL Liège, Katholieke Universiteit Leuven: Herschel-PACS; INTEGRAL-Spectrometer SPI.

Brasilien

Observatorio Nacional, Rio de Janeiro: DES.

Centro Brasileiro de Pesquisas, Rio: DES.

Universidade Federal do Rio, Rio de Janeiro: DES.

Universidad de Sao Paulo: Galaxienenstehung.

Universidade Federal do Rio Grande do Sul: Nearby Active Galaxies.

Canada

Dunlap Observatory, Richmond Hill: First Hydrostatic Cores (FHSCs).

NRC - Herzberg, Ottawa: CAS Observations.

Queens's University, Kingston: CAS-Beobachtungen.

University of Alberta, Edmonton (Alberta): CAS-Beobachtungen.

University of Toronto: CAS-Beobachtungen.

University of Victoria, Victoria: CAS-Beobachtungen.

University of Western Ontario, London (Ontario): CAS-Beobachtungen; CAS-Theorie.

Chile

ESO, Joint ALMA Observatory, Santiago: CAS-Beobachtungen.

Universidad de Concepcion: Röntgen-Doppelsternsysteme.

Universidad Catolica Santiago: Röntgen-Doppelsternsysteme; Galaktisches Zentrum.

China

Donghua University, Shanghai: CAS-Theorie.

Institute for High-Energy Physics (IHEP), Peking: AGN und unidentifizierte Gammaquellen von COMPTEL und INTEGRAL.

Nanjing University, Nanjing: CAS-Beobachtungen.

Nationanal Observatory of China: Beijing: CAS-Beobachtungen.

University of Hongkong: Strahlungsmechanismen von Pulsaren vom Röntgen bis zum Gammabereich.

Dänemark

Dänemarks Technische Universität: ATHENA.

Deutschland

Astrophysikalisches Institut Potsdam: eROSITA; XMM-Newton; OPTIMA; ARGOS; HETDEX; 4MOST.

European Southern Observatory (ESO), Garching: GRAVITY; Galaxienentstehung; MICADO; Nukleare Astrophysik; ERIS; Black Hole Cam; Infrared Dark Clouds; CAS-Beobachtungen.

Fraunhofer Institut für Integrierte Schaltungen, Erlangen: Mikroelektronikentwicklungen; ATHENA.

Heinrich-Heine-Universität, Düsseldorf: Soft Matter Physics.

Institut für Astronomie und Astrophysik Tübingen (IAAT): XMM-Newton; eROSITA; ATHENA.

Institut für Astrophysik Göttingen: MICADO.

Institut für Festkörperphysik und Werkstoff-Forschung, Dresden: Entwicklung weichmagnetischer Werkstoffe.

Institut für Festkörperphysik und Werkstoff-Forschung, Dresden: Entwicklung weichmagnetischer Werkstoffe.

Institut fur Materialphysik im Weltraum, Köln: Glasübergänge.

Landessternwarte Heidelberg-Königstuhl: Nahinfrarotspektrograph LUCI für LBT; Galaxienentstehung; ARGOS.

Laser Zentrum Hannover: Dichroics for ARGOS; Anti-Reflection Coating ERIS.

Ludwig-Maximilians-Universität (Universitäts-Sternwarte), München: MICADO; HETDEX; eROSITA.

Maier-Leibnitz Laboratorium, Garching: eROSITA.

Max-Planck-Institut für Astronomie, Heidelberg: GRAVITY; LUCI; PanSTARRS; SDSS; ARGOS; MICADO; EUCLID; CAS-Beobachtungen.

Max-Planck-Institut für Astrophysik, Garching: GAVO; SDSS; OPTIMA; eROSITA.

Max-Planck-Institut für Gravitationsphysik, Potsdam: Black Hole Cam.

Max-Planck-Institut für Physik (Werner Heisenberg Institut), München: MPI Halbleiterlabor; CAST; eROSITA; ATHENA.

Max-Planck-Institut für Radioastronomie, Bonn: ARGOS; Black Hole Cam; CAS-Beobachtungen.

Physikalisch-Technische Bundesanstalt Berlin: eROSITA.

Technische Universität Berlin: Interstellares Medium.

Technische Universität Darmstadt: CAST.

Technische Universität München: Nukleare Astrophysik; CAS-Projekte.

Thüringer Landessternwarte Tautenberg: GROND; Gamma-Ray Bursts.

Universität Bochum: LUCI.

Universität Bonn: Test von Pixeldetektoren für ATHENA; eROSITA; EUCLID.

Universität der Bundeswehr, München: CAS-Projekte.

Universität Düsseldorf: ERC Advanced Grant; CAS-Theorie.

Universität Erlangen (ECAP): eROSITA; ATHENA.

Universität Hamburg: eROSITA; OPTIMA (Flarestars).

Universität Heidelberg: ATHENA; XFEL; CAS-Beobachtungen; CAS-Theorie.

Universität Jena: Isolierte Neutronensterne; Nukleare Astrophysik.

Universität Köln: Galaktisches Zentrum; GRAVITY; CAS-Beobachtungen; CAS-Theorie; CAS-Labor.

Universität Mannheim: ATHENA; XFEL.

Universität Stuttgart: CAS-Projekte.

Universität Würzburg: AGADE.

Finnland

Universität of Helsinki, Helsinki: CAS-Theorie; CAS-Beobachtungen.

Frankreich

Aix-Marseille University, Marseille: CAS-Beobachtungen; CAS-Theorie.

CEA, Saclay: INTEGRAL-Spektrometer SPI; CAST; EUCLID; ATHENA.

Centre d'Etude Spatiale des Rayonnements (UPS), Toulouse: INTEGRAL-Spektrometer SPI; CAS-Beobachtungen.

IAP Paris: Nukleare Astrophysik.

IAPG Grenoble: GRAVITY; MICADO; Astrochemie; CAS-Beobachtungen; CAS-Theorie.

IRAM, Grenoble: CAS-Beobachtungen.

Laboratoire d'Astrophysique de Marseille (LAM): EUCLID; Gamma-Ray Bursts.

Laboratoire Univers et Particules de Montpellier, Montpellier: Cosmic-ray propagation in molecular clouds.

Observatoire de Paris (GEPI): MICADO; GRAVITY.

Observatoire de Paris (LESIA): MICADO; GRAVITY; CAS-Theorie.

Observatoire de Paris-Meudon: GRAVITY; Galaktisches Zentrum.

University of Bordeaux, Bordeaux: CAS-Theorie.

Université de Cergy-Pontoise, Cergy Pontoise Cedex: CAS-Beobachtungen.

Universite Paris Diderot, Paris: CAS-Beobachtungen.

Université de Rennes, Rennes: CAS-Beobachtungen.

Université de Toulouse, Toulouse: CAS-Beobachtungen.

Griechenland

University of Crete and Foundation for Research and Technology Hellas (FORTH), Heraklion: Ausbau und Betrieb der Skinakas Sternwarte; Untersuchung von windakkretierenden Röntgendoppelsternsystemen; Entwicklung und Einsatz des OPTIMA Photometers; optische Identifikation und Monitoring von Röntgen-AGN; Novae.

Großbritannien

Queen's University, Belfast: PanSTARRS.

John Moores University, Liverpool: Himmelsdurchmusterung Galaxienhaufen; Infrared Dark Clouds; CAS-Beobachtungen.

Open University, Milton Keynes: Kataklysmische Veränderliche; Novae; ATHENA.

Queen Mary University of London, London: CAS-Beobachtungen.

Rutherford Appleton Laboratory, Council for the Central Laboratory of the Research Councils: SIS-Junctions.

United Kingdom Astronomy Technology Centre (UKATC): EUCLID; ERIS.

University of Cambridge: DES.

University College London, MSSL: High Energy Pulsars; EUCLID; DES; CAS-Beobachtungen.

University of Durham: PanSTARRS.

University of Edinburgh: DES; PanSTARRS.

University of Leeds: CAS-Beobachtungen; CAS-Theorie.

University of Leicester: XMM-Newton Datenanalyse; ATHENA; Swift.

University of Nottingham: DES.

University of Portsmouth: DES.

University of Sussex: DES.

University of Southampton: Magellanic Clouds.

Irak

University of AL-Muthanna, AL-Muthanna: CAS-Beobachtungen.

Irland

National University of Ireland, Galway: High Time Resolution Astronomy; CAS-Beobachtungen.

University College Dublin, Dublin: Fermi/GBM.

Israel

School of Physics and Astronomy, Wise Observatory, Tel Aviv: Aktive Galaxien; Galaxienentwicklung; Interstellares Medium.

Weizmann Institut, Rehovot: Galaktisches Zentrum.

Italien

Brera Astronomical Observatory: Himmelsdurchmusterung Galaxienhaufen.

IFCAI-CNR Palermo: XMM-Newton Beobachtungen von Neutronensternen und Pulsaren.

INAF (Insituto Nationale di Astrofisica): ATHENA, EUCLID.

INAF Arcetri, Florenz: ARGOS; LBT; ERIS; CAS-Beobachtungen; CR in Molecular Clouds; CAS-Labor; CAS-Theorie.

INAF Padua: ERIS; MICADO; LBT.

INAF Roma: LBT; Nukleare Astrophysik.

INAF Trieste: Gamma-Ray Bursts; Fermi/LAT.

INFR Frascati: SIDDHARTA.

Scuola Normale Superiore, Pisa: CAS-Beobachtungen.

University Bologna: EUCLID; CAS-Labor; CAS-Beobachtungen.

Università di Torino, Torino: CAS-Beobachtungen.

Università di Firenze, Firenze: CAS-Beobachtungen.

Università di Perugia, Perugia: CAS-Beobachtungen.

Japan

Institute of Space and Astronautical Science, Kanagawa: CAS-Beobachtungen; CAS-Labor.

Institute of Physical and Chemical Research (RIKEN), Hirosawa: CAS-Beobachtungen.

National Astronomical Observatory of Japan, Mitaka/Tokio: CAS-Beobachtungen; CAS-Theorie; Galaxienentwicklung.

Tohoku University, Sendai: Galaxienentwicklung.

Tokio Institute of Technology (TITECH), Ookayama: ASCA/XMM-Newton Beobachtungen von AGN.

University of Osaka: Astro-H.

University of Tokyo, Tokyo: CAS-Beobachtungen.

Korea

Seoul National University, Seoul, Korea: CAS-Beobachtungen.

Kroatien

Ministry of Science and Technology, Zagreb: CAST.

Lettland

Ventspils University College, Ventspils: CAS-Theorie.

Mexiko

Universidad Nacional Autónoma de México, Jiquilpan: CAS-Theorie.

Niederlande

ESTEC, Noordwijk: XMM-Newton-TS-Spiegelkalibration; CCD Entwicklung; Radiation Performance Instrument; INTEGRAL; EUCLID; ATHENA.

JIVE Dwingeloo: Black Hole Cam.

NOVA (Leiden, Groningen, Amsterdam): MICADO; ERIS.

Leiden University, Leiden: CAS-Beobachtungen; CAS-Theorie.

Radboud University, Nijmegen: Black Hole Cam.

SRON, Utrecht: Chandra-LETG.

University of Groningen, Kapteyn Institute: Rekonstruktion der Dichteverteilung im Universum; EUCLID; CAS-Theorie; CAS-Beobachtungen.

Österreich

Institut für Weltraumforschung, Graz: ATHENA WFI.

RICAM Linz: MICADO.

Universität und TU Wien: MICADO; ATHENA.

Universität Innsbruck: MICADO.

Universität Linz: MICADO.

Polen

Nicolaus Copernicus (ZAMK), Torun: Pulsars Astronomical Centers; ATHENA.

University of Poznan, Poznan; CAS-Beobachtungen; CAS-Theorie.

University Zielona Gora: OPTIMA.

Portugal

Observatorio Astronomico de Lisboa, Lisbon: Athena.

SIM Lissabon: GRAVITY.

Russland

Institute of Astronomy, Moscow: CAS-Theorie.

Lebedev Institute of Physics, Moscow: CAS-Theorie.

Staatliche Technische Universität Bauman, Moscow: Stark gekoppelte Systeme; Time-domain spectroscopy; CAS-Theorie; CAS-Labor.

Space Research Institute (IKI) of the Russian Academy of Science, Moscow: eROSITA; Spectrum-Röntgen-Gamma.

Skobeltsyn Institute of Nuclear Physics, Moscow: Nukleare Astrophysik; Gamma-Ray Bursts; AGADE.

Ural Federal University, Yekaterinburg: CAS-Beobachtungen.

Schweden

University Lund/Observatory: OPTIMA.

Schweiz

CERN, Geneva: CAST.

ETH Zürich: ERIS.

Observatoire de Genève Sauverny, Geneva: ISDC/INTEGRAL; Nukleare Astrophysik; EUCLID.

Universität Basel: Nukleare Astrophysik.

Univrsity of Geneva: ATHENA.

University of Zurich: Infrared Dark Clouds.

Spanien

Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas: DES.

Centro de Astrobiologia (CSIC/INTA), Madrid: CAS-Labor.

Ernst & Young Spain, Barcelona: CAS-Projekte.

ESAC, Madrid: XMM-Newton Science Operations Center; INTEGRAL Science Operations Center; CAS-Beobachtungen.

Instituto de Astrofisica de Andalucia, Granada: CAS-Beobachtungen.

Instituto de Ciencias del Espacio, Bellaterra: DES; CAS-Beobachtungen.

Institut de Fisica d'Altes Energies, Barcelona: DES; EUCLID.

Universität Valencia, Valencia: INTEGRAL-Spektrometer SPI.

Universidad de Zaragoza: CAST.

Observatorio Astronomico de Mallorca: Novae; Kometen.

Observatorio Astronómico Nacional, Madrid: CAS-Beobachtungen.

Taiwan

Institute of Astronomy and Astrophysics (ASIAA), Taipei: CAS-Theorie; CAS-Beobachtungen.

National Central University, Chungli: PanSTARRS.

Tschechien

Charles University, Prague: CAS-Theorie.

Türkei

Bogazici University, Istanbul: CAST.

Ungarn

Konkoly Observatory: Herschel-PACS; CAS-Beobachtungen; CAS-Theorie.

USA

Argonne National Laboratory: DES.

Astronomical Sciences National Science Foundation, Arlington: CAS-Beobachtungen.

Brookhaven National Laboratory: strahlenharte JFET-Elektronik; strahlenharte Detektoren.

California Inst. of Technology, Pasadena: X-ray survey.

CfA, Cambridge: ATHENA WFI; XMM-Newton/Chandra Kalibration.

Clemson University: Gamma-Ray Bursts; Nukleare Astrophysik.

Fermilab, Batavia: DES.

Harvard University: PanSTARRS.

Harvard-Smithsonian Center for Astrophysics, Cambridge: Molecular cloud cores chemistry and dynamics.

Institute for Astronomy, Hawaii, Honolulu: Galaxienentstehung; PanSTARRS; NIR Kamera für Wendelstein.

Jet Propulsion Laboratory, Pasadena: EUCLID; CAS-Beobachtungen.

Johns Hopkins University: PanSTARRS.

Marshall Space Flight Center, Huntsville: Fermi Gamma-Ray Burst Monitor; XMM-Newton und Chandra Beobachtungen von Neutronensternen, Pulsaren und Supernovaüberresten.

MIT, Cambridge: ATHENA WFI.

NASA/Ames Research Center, Mofett Field (CA): MHD shocks; CAS-Beobachtungen.

NASA/Goddard Space Flight Center, Greenbelt, MD: INTEGRAL-Spektrometer SPI; Swift.

National Radio Astronomy Observatory, Socorro: CAS-Beobachtungen.

NOAO, Tucson: DES.

Ohio State University, Columbus: DES; LBT.

Pacific Northwest National Laboratory (PNNL), Richland: CAST.

Pennsylvania State University: HETDEX; ATHENA/WFI; Swift.

Research Corporation, Tucson: LBT.

San Jose State University: MHD shocks.

SLAC, Stanford: CAMP; DES; ATHENA.

Smithsonian Astrophysical Observatory, Cambridge: Chandra-LETGS; Röntgendoppelsterne in M31; ATHENA.

Space Telescope Science Institute, Baltimore: Galaxienentstehung; PanSTARRS; Turbulenz; CAS-Obsevations.

Stanford University: DES, Fermi/LAT; Fermi/GBM.

Texas A & M University, College Station: DES.

Texas State University, San Marcos: HETDEX.

University of Arizona, Tucson: Kosmische Strahlung; Planetenentstehung; LBT; ARGOS; CAS-Beobachtungen.

University of California, Berkeley: MPG/UCB-Kollaboration; FAST; INTEGRAL-Spektrometer SPI; Superbubbles.

University of California, Santa Cruz: DES.

University of Chicago: DES: CAS-Beobachtungen.

University of Colorado, Boulder (Co): Superbubbles; CAS-Beobachtungen.

University of Florida, Gainesville (Fl): Infrared Dark Clouds; CAS-Beobachtungen; CAS-Theorie.

University of Illinois at Urbana-Champaign: DES.

University of Massachusetts, Amherst: CAS-Beobachtungen.

University of Michigan: DES.

University of Pensylvania: DES.

University of Pittsburgh: Galaxienentstehung.

University of Texas, Austin: Galaxienentstehung; HETDEX.

University of Toledo: Galaxienentstehung.

University of Virginia, Charlottesville: CAS-Theorie.

Yale University, New Haven: CAS-Beobachtungen.

7.3 Multinationale Projekte

ARGOS – Laserleitstern für das LBT: API, LSW Heidelberg, MPIA, MPIfR, Germany; University of Arizona, USA.

ASPI – The International Wave Consortium: CNR-IFSI Frascati, Italy; LPCE/CNRS Orleans, France; Dept. of Automatic Control and Systems University of Sheffield, UK.

ATHENA – Advanced Telescope for High Energy Astrophysics: Dänemarks Technische Universität, Dänemark; Nikolaus Kopernikus Astronomical Center, Polen; Universität Wien, Österreich; IWF, Graz; INAF Italy, Italy; CEA Frankreich, Frankreich; University of Leicester, Open University, UK; Institut für Astronomie und Astrophysik Tübingen, Erlangen Centre for Astroparticle Physics (ECAP), Germany; ESA; NOA, Greece; Universität Geneva, Schweiz; Institute for Astrophysics, Portugal.

BOSS – Baryon Oscillation Spectroscopic Survey: SDSS-IV Collaboration.

CAST – CERN Solar Axion Telescope: CERN Geneva Switzerland; TU Darmstadt, MPI für Physik (WHI) München, Germany; Universidad de Zaragoza, Spain; Bogazici University Istanbul, Turkey; Ministry of Science and Technology Zagreb, Croatia; CEA/Sacklay DAPNIA/SED, France; Pacific Northwest National Laboratory, Richland, USA.

Chandra X-ray Observatory: Marshall Space Flight Center Huntsville, Massachusetts Institute of Technology Cambridge, Smithsonian Astrophysical Observatory Cambridge, USA; Space Research Institute Utrecht, The Netherlands; Universität Hamburg, Germany.

COSMOS – Cosmic Evolution Survey: INAF-Osservatorio Astronomico di Bologna, INAF-Osservatorio Astronomico di Roma, INAF-Osservatorio Astrofisico di Arcetri, INAF/IASF-CNR, Sezione di Milano, IRA-INAF, Bologna, Dipartimento di Astronomia, Universita Padova, Dipartimento di Fisica, Universita degli Studi Roma Tre, Italy; Harvard-Smithsonian Centre for Astrophysics, Cambridge, Department of Physics, Carnegie Mellon University, Pittsburg, Institute for Astronomy, University of Hawaii, California Institute of Technology, Pasadena, Department of Astronomy, Yale University, USA; INTEGRAL Science Data Centre, Versoix, Switzerland; Laboratoire d'Astrophysique de Marseille, France.

DES – The Dark Energy Survey: LMU München, Excellence Cluster Universe, Germany; The Fermi National Accelerator Laboratory (Fermilab), University of Chicago, NOAO, University of Michigan, University of Pennsylvania, University of Illinois at Urbana-Champaign, Ohio State University, Texas A&M University, University of California Santa Cruz, Stanford University, SLAC National Accelerator Laboratory, The Lawrence Berkeley National Laboratory, Argonne National Laboratory, USA; University College London,

University of Cambridge, University of Edinburgh, University of Portsmouth, University of Sussex, University of Nottingham, UK; Observatorio Nacional, Centro Brasileiro des Pesquisas Fisicas, Universidade Federal do Rio, Brasilien; Instituto de Ciencias dei Espacio, Institut de Fisica d'Altes Energies, Centro de Investigaciones Energeticas Medioambientales y Tecnologicas, Spain.

eBOSS – SDSS-IV Extended Baryon Oscillation Spectroscopic Survey: Carnegie Mellon University (CMU), University of Colorado Boulder, Harvard-Smithsonian Center for Astrophysics Participation Group, Johns Hopkins University, Kalvi Institute for the Physics and Mathematics of the Universe, New Meico State University, New York University, The Ohio State University, Penn State University, University of Utah, University of Wisconsin, Yale University, USA; Max-Planck-Institut fuer Astrophysik (MPA Garching), Max-Planck-Institut für extraterrestrische Physik (MPE), Max-Planck-Institut für Astronomie (MPIA Heidelberg), Germany; National Astronomical Observatories of China, Shanghai Astronomical Observatory, China; United Kingdom Participation Group, University of Portsmouth, UK.

ERIS – Enhanced Resolution Imager and Spectograph for the VLT: ESO, Germany; ETH Zürich, Switzerland; INAF Arcetri (with OAA, OATe and OAPd), Italy; UKATC Edinburgh, Scotland; NOVA Leiden, The Netherlands.

eROSITA – extended ROentgen Survey with an Imaging Telescope Array: AIP Potsdam, Universität Bonn, Universität Erlangen, Universität Tübingen, Universität Hamburg, Remeis-Sternwarte Bamberg, MPA Garching, Germany; IKI Moskau, Russia.

EUCLID – ESA Mission to map the Dark Energy: ESA; CEA Saclay, LAM, France; University Bologna, INAF, Italy; MSSL, Durham University, UKATC, UK; STScI, USA; MPIA Heidelberg, Universität Bonn, Germany.

Fermi/GBM – Fermi Gamma-Ray Burst Monitor: Marshall Space Flight Center Huntsville, University of Huntsville, USA.

Fermi/LAT – Fermi Large Area Telescope: Stanford University Palo Alto, Naval Research Laboratory Washington DC, Sonoma State University Rohnert Park, Lockheed Martin Corporation Palo Alto, University of California Santa Cruz, University of Chicago, University of Maryland Greenbelt, NASA Ames Research Center Moffett Field, NASA Goddard Space Flight Center for High Energy Astrophysics Greenbelt, Boston University, University of Utah Salt Lake City, University of Washington Seattle, SLAC Particle Astrophysics Group Palo Alto, USA; ICTP and INFN Trieste, Istituto Nacionale di Fisica Nucleare Trieste, Italy; University of Tokyo, Japan; CEA Saclay, France.

GRAVITY – Instrument for VLT Interferometry: MPIA Heidelberg, Universität Köln, ESO, Garching, Germany; SIM Lissabon und Porto, Portugal; IPAG, Grenoble, Observatoire de Paris / Meudon (LESIA), France.

HETDEX – Hobby-Eberly Telescope Dark Energy Experiment: University of Texas, Austin, Pennsylvania State University, Texas A&M University, USA; AIP Potsdam, LMU, USM, Germany.

INTAS – Cooperation of Western and Eastern European Scientist: France, Germany, Norway, Russia.

ISDC – INTEGRAL Science Data Centre: Observatoire de Geneva Sauverny, Switzerland; Service d'Astrophysique Centre d'Etudes de Saclay, France; Rutherford Appleton Laboratory Oxon Dept. of Physics University Southhampton, UK; Institut für Astronomie und Astrophysik Tübingen, Germany; Danish Space Research Institute Lyngby, Denmark; University College Dublin, Ireland; Istituto di Fisica Milano, Istituto die Astrofisica Spatiale Frascati, Italy; N. Copernikus Astronomical Center Warsaw, Poland; Space Research Institute of the Russian Academy of Sciences Moscow, Russia; Laboratory for High Energy Astrophysics GSFC Greenbelt, USA.

INTEGRAL-Spectrometer SPI: Centre d'Etude Spatiale des Rayonnements (CESR) Toulouse, CEA Saclay Gif-sur-Yvette, France; University de Valencia Burjassot, Spain.

LBT – Large Binocular Telescope Project: MPIA Heidelberg, MPIfR Bonn, Landessternwarte Heidelberg Königstuhl, Astrophysikalisches Institut Potsdam, Germany; University of Arizona Tucson, Ohio State University, Columbus, Research Corporation USA; INAF, Italy.

LUCI (Instrument for LBT): LSW Heidelberg, MPIA, Universität Bochum, Germany.

MICADO – Multi-Adaptive Optics Imaging Camera for Deep Observations: LMU (USM), MPIA Heidelberg, IFA Göttingen, Germany; INAF-OAPD Padova, Italy; A* (partnership of University Vienna, University Innsbruck, University Linz and RICAM Linz), Austria; NOVA (federation of Dutch university astronomy departments of the universitys in Amsterdam, Groningen, Leiden, Nijmegen), The Netherlands; CNRS/INSU (representing LESIA, GEPI and IPAG), Paris, France.

MXT – Microchannel X-Ray Telescope for Gamma-Ray Bursts: CEA, Saclay, France; University of Leicester, UK.

OPTIMA – Optical Pulsar TIMing Analyzer: Astrophysikalisches Institut Potsdam, MPI für Astrophysik, Universität Hamburg, Germany; University of Crete, Greece; University Zielona Gora, Poland; University Lund/Observatory, Schweden.

PanSTARRS – Panoramic Survey Telescope & Rapid Response System: MPIA Heidelberg, Germany; University of Hawaii, Harvard University, Johns Hopkins Univ. Baltimore, MD, USA; Universities of Durham, Edinburgh, Belfast, UK.

PFS – The Subaru Prime Focus Spectrosgraph Collaboration: Kalvi Insitute for the Physics and Mathematics of the Universe, California Institute of Technology, NASA Jet Propulsion Laboratory, Princeton University, Johns Hopkins University, USA; The University of Tokyo Institutes for Advanced Study (UTIAS), University of Tokyo, National Astronomical Observatory of Japan, Academia Sinica, Japan; Institute of Astronomy and Astrophysics (ASIAA), Taiwan; Laboratoire d'Astrophysiqhe de Marseille, France; Brazilian Consortium: IAG Universidad de Sao Paolo, Laboratorio Nacional de Astrofisica, Brazil; Max-Planck Society, Max-Planck-Institut für Astrophysik (MPA, Garching), Max-Planck-Insitutu für extraterrestrische Physik (MPE), Germany; Chinese Consortium: Shanghai Jiao Tong University, National Astonomical Observatories of China, Tsinghua University, The University of Science and Technology of China, Xiamen University, Peking University, China.

SDSS – Sloan Digital Sky Survey: MPA Garching, MPIA Heidelberg, Germany; Univ. of Washington, Seattle, Fermi National Accelerator Laboratory, Batavia, Univ. of Michigan, Ann Arbor, Carnegie Mellon Univ., Pittsburgh, Penn State Univ., University Park, Princeton Univ. Observatory, Princeton, The Institute of Advanced Study Princeton, Space Telescope Science Institute, Baltimore, Johns Hopkins Univ. Baltimore, USA.

Swift – Gamma-Ray Burst Mission: NASA/GSFC Greenbelt, Penn State University, USA; University of Leicester, Mullard Space Science Laboratory London, UK; Osservatorio Astronomico Brera, Italy.

XMM-Newton/Survey Science Center (SSC): Astrophysikalisches Institut Potsdam, Germany; SAP Saclay, CDS Strasbourg, CESR Toulouse, France; University of Leicester, Institute of Astronomy Cambridge, MSSL London, UK.

XMM-Newton/European Photo Imaging Camera (EPIC): SAP Saclay, IAS Orsay, CESR Toulouse, France; University of Leicester, University Birmingham, UK; CNR Mailand-Palermo-Bologna-Frascati, Osservatorio Astronomico Mailand, Italy; Institut für Astronomie und Astrophysik Tübingen, Germany.

7.4 Projekte mit der Industrie

3d shape GmbH, Erlangen: Metrology for slumped glass mirror study.

4D Engineering, Gilching, Germany: Software development for GRAVITY.

ABN GmbH, Neuried: Betreuung der Testanlage PANTER.

Absolut-System, Seyssinet-Pariset, France: 40K cooling system MICADO.

af inventions, Braunschweig: FPGA programmierung for eROSITA.

Airbus Defense and Space, München: EUCLID design study; eROSITA.

Array Electronics, Egmanting: DAQ development OPTIMA.

Bach Research, Boulder, USA: High resolution grating for ERIS.

BASF Coatings AG, Münster: Untersuchung der Streueigenschaften von Mikropartikeln.

Buchberger GmbH, Tuchenbach: Fertigung Strukturteile für PANTER-Manipulatore; ERIS telescope flange.

CryoVac GmbH, Troisdorf: MICADO Cryosat Study.

Dico-Solutions, München: Elektronikentwicklung für eROSITA.

ECM Engineered Ceramic Materials GmbH, Moosinning: Hersteller von CESIC.

EATON Powering Business Worldwide, Camarillo, CA, USA: Actuators separation-nuts for eROSITA.

ESL GmbH, Berlin: Fertigung von Leiterplatten.

Fraunhofer IOF, Jena: Coating for ERIS; Spiegelenetwicklung für MICADO.

Freyer GmbH, Tuningen: PANTER; parts for LUCI; eROSITA.

GEWO Feinmechanik GmbH, Wörth/Hörlkofen: Mechanische Fertigung.

Gräfe Spezialoptik GmbH, Camburg: Zerodur-Materialbearbeitung und -Lieferant.

Guido Lex Werkzeugbau GmbH, Miesbach: Strukturteile für LUCI.

Hans Englett OHG, Berlin: Fertigung von Frontplatten und Meßvorrichtungen.

Hochschule München, Laserlabor, Prof. Heinz Huber, München: Materialbearbeitung mit Ultrakurzpulsarlaser.

HPS München: Multi-Layer Insulation (MLI) for eROSITA.

IABG, Ottobrunn: Umgebungs-Tests eROSITA.

Ingenieurbüro Buttler, Essen: Front-End Elektronikentwicklung (ATHENA, eROSITA).

Ingenieurbüro Josef Eder, Hilgertshausen: System Engeneering for eROSITA; GRAVITY; ATHENA; ERIS.

Ingenieurbüro Weisz, München: Design and mechanical engineering for LUCI, ERIS and MICADO.

Kampf Telescope Optics (KTO), München: Design & System Engineering for MICADO.

Korth Kristalle GmbH, Kiel: Lenses for ERIS Spectrometer.

Kugler GmbH, Salem: ERIS.

Laserjob GmbH, Fürstenfeldbruck: Entwicklung Röntgenbaffle für eROSITA.

LT Ultra, Herdwangen-Schönach: Spiegelhersteller.

Luxel Corporation, USA: Filter for eROSITA.

Media Lario Technologies, Borisio Parini, Italy: eROSITA mirror system.

MOOG Inc., East Aurora, USA: high pressure valves for eROSITA.

OHB System AG, München; EUCLID design study.

Peter Feckl Maschinenbau GmbH, Forstern: Mechanische Fertigung.

RUAG Austria: Teleskop-Deckel-Mechanismus für eROSITA.

Sacher Lasertechnik, Marburg: Metrology Laser for GRAVITY.

Safran Reosc, Saint-Pierre-du-Perray, France: Spiegelentwicklung für MICADO.

Technotron, Lindau: Entwicklung und Fertigung der Platinen Layouts für eROSITA.

8 Veröffentlichungen

8.1 In Zeitschriften und Büchern

Abbott, B.P., R. Abbott, T.D. Abbott, ..., A. v. Kienlin, ..., R. Diehl, et al.: Gravitational W and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A. Ap. J. Lett. 848, L13 (2017).

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8.2 Instrumentelle Veröffentlichungen

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8.3 Konferenzbeiträge

Im Jahr 2017 waren MPE Wissenschaftler als Autoren bei 4 referierten und bei 76 nicht-referierten Konferenzbeiträgen beteiligt, davon mit 32 Erstautorschaften. Die vollständige Liste der Konferenzbeiträge kann auf der MPE Internetseite (`http://www.mpe.mpg.de`) unter dem Punkt „Forschung/Veröffentlichungen“ eingesehen werden.

8.4 Populärwissenschaftliche und sonstige Veröffentlichungen

GRAVITY Collaboration, R. Abuter, M. Accardo, A. Amorim, ..., J. Dexter, ..., F., Eisenhauer, ..., R., Genzel, Gillessen, S., ..., O. Pfuhl, ..., P.M. Plewa ..., S. Rabien, ..., E. Sturm, ..., I. Waisberg, ..., F. Widmann, E. Wieprecht, ..., E. Wiezorrek, et al.: First Light for GRAVITY: A New Era for Optical Interferometry. The Messenger, 170, 10-15 (2017).

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8.5 Vorträge, Astronomische Telegramme und Zirkulare, Poster

Mitarbeiter des MPE hielten im Jahr 2017 insgesamt 325 Vorträge auf Konferenzen, bei Seminaren und Kolloquien und in der Öffentlichkeitsarbeit im In- und Ausland. Zusätzlich haben sie an insgesamt 133 astronomischen Telegrammen, Zirkularen und Datenkatalogen mitgewirkt und 26 Poster als Erstautoren auf Konferenzen präsentiert. Die Zahlen, verteilt auf die einzelnen Arbeitsbereiche, sind in Tabelle 1 gelistet. Die Zahlen in Klammern geben die eingeladenen Vorträge (bei Konferenzen und zu Kolloquien) an, sowie die Zahl der Erstautorschaften bei Telegrammen und Zirkularen.

Tabelle 1: Vorträge, Telegramme/Zirkulare und Poster

Arbeitsgruppe	Vorträge	Telegramme, Zirkulare	Poster
Infrarot-/Submillimeter-Astronomie	131 (92))	10 (4)	6
Optische & Interpretative Astronomie	39 (19)	13 (6)	2
Hochenergieastrophysik	111 (57)	96 (36)	5
Zentrum Astrochemische Studien	44 (21)	13 (5)	13
Unabhängige Forschungsgruppen	0 (0)	1 (0)	0

Die vollständige Liste der Vorträge, der astronomischen Telegramme und Zirkulare sowie der Poster kann auf der MPE Internetseite (`http://www.mpe.mpg.de`) unter dem Punkt „Forschung/Veröffentlichungen“ eingesehen werden.

9 Öffentlichkeitsarbeit

Das MPE engagierte sich auch in der Öffentlichkeitsarbeit. Im Jahr 2017 hielten MPE-Wissenschaftler 21 populärwissenschaftliche Vorträge (z.B. an Schulen, Planetarien, bei Astronomischen Vereinigungen). Bei 25 Institutsführungen gewannen Gruppen, hauptsächlich Schulklassen von naturwissenschaftlich orientierten Schulen, einen Einblick in das Institut und seine Wissenschaft. Am „Girls' Day“ informierten sich 45 Mädchen über das MPE, 19 Schüler/innen erhielten in ein- oder zweiwöchigen Praktika und 7 Hochschüler in mehrwöchigen Praktika einen Einblick in die Arbeitswelt von Astrophysikern. Am zweijährig stattfindenden „Tag der offenen Tür“ im Oktober 2017 kamen etwa 2000 Besucher

ins MPE.

Weitere Informationen zur Öffentlichkeitsarbeit sind auf den MPE Webseiten zu finden (`http://www.mpe.mpg.de/`).

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