

# Garching

## Max-Planck-Institut für extraterrestrische Physik

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### 1 Einleitung

Das Max-Planck-Institut für extraterrestrische Physik (MPE) befaßte sich 2014 mit grundlegenden Themen der Astrophysik, die sich sechs großen Bereichen zuordnen lassen: (i) *Großräumige Struktur und Kosmologie*, (ii) *Galaxien und Galaxienentwicklung*, (iii) *Massereiche Schwarze Löcher und Aktive Galaxien*, (iv) *Entstehung von Sternen und Planetensystemen*, (v) *Sternentwicklung und Interstellares Medium* und der (vi) *Physik des Sonnensystems*.

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, Raketen, Satelliten und Raumsonden durchgeführt. In zunehmendem Maße setzen wir aber, vor allem im optischen und Infrarotbereich, auch Instrumente an erdgebundenen Teleskopen ein.

Methodisch lassen sich die Forschungsaktivitäten des MPE in mehrere Bereiche einteilen. In der beobachtenden Astrophysik, für die am MPE innovative Instrumente gebaut werden, wird die Strahlung entfernter Objekte mit Teleskopen in den Millimeter/Submillimeter-, Infrarot-, Optischen-, Röntgen- und Gammabereich 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 technologische Einrichtung des MPE ist von besonderer Bedeutung: Die 130 m lange Vakuumanlage *Panzer* 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 2014.

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 sogar 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 35 am MPE arbeiten, gehört die IMPRS on Astrophysics zu den größten Einrichtungen dieser Art weltweit.

## 2 Personal und Ausstattung

### 2.1 Personalstand

#### *Direktoren:*

Prof. Dr. R. Genzel (Geschäftsführung), Infrarot- und Submillimeter-Astronomie; Prof. Dr. R. Bender, Optische und Interpretative Astronomie; Prof. Dr. P. Caselli, Zentrum für Astrochemische Studien; Prof. Dr. K. Nandra, Hochenergie-Astrophysik; 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); Prof. Dr. Y. Tanaka (JSPS, Bonn; MPE, Deutschland); Prof. Dr. C. H. Townes (UC Berkeley, USA).

#### *Fachbeirat:*

Prof. Dr. J. Bergeron (Institute d’Astrophysique de Paris, Frankreich); Prof. Dr. M. Colless (Austrian Astronomical Observatory, Australien); Prof. Dr. K. Freeman (Mt. Stromlo Observatory, Australien); Dr. N. Gehrels (NASA/GSFC, 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:*

Dr. L. Baumgarten (ehemaliges Vorstandsmitglied DLR); Prof. Dr. A. Bode (Vizepräsident TU München); J. Breitkopf (Kayser-Threde GmbH, München); H-J. Dürrmeier (ehemalig Süddeutscher Verlag, München); Prof. Dr. W. Glatthaar (ehemaliger Präsident der

Universität Witten/Herdecke, Stuttgart, Kuratoriumsvorsitzender); Dr. G. Gruppe (Bayerisches Staatsministerium für Wirtschaft, Infrastruktur, Verkehr und Technologie, München); Prof. Dr. B. Huber (Rektor der LMU München); Dr. M. Mayer (ehemaliges Mitglied des Bundestages, Höhenkirchen); Min.Dir. J. Meyer (Bundesministerium für Wirtschaft und Technologie, Berlin); Prof. Dr. E. Rohkamm (Blohm & Voss GmbH, Hamburg).

*Wissenschaftliche Mitarbeiter und Angestellte*

*A. Infrarot-und Sub-mm-Astronomie*

A. Agudo Berbel, Dr. K. Bandara, Dr. S. Berta, Dr. N. Blind, Dr. S. Bruderer, Dr. P. Buschkamp, Dr. A. Contursi, Dr. R. Davies, S. Dengler, Dr. J.A. de Jong, Dr. J. Dexter, Dr. V. Doublier Pritchard, Dr. F. Eisenhauer, Dr. D. Fedele, Dipl.-Phys. H. Feuchtgruber, Dr. N. Förster Schreiber, Dr. S. Gillessen, Dr. J. Grácia Carpio, Dr. M. Habibi, Dr. M. Hartl, S. Harai-Ströbl, A. Kleiser, Dr. Y. Kok, Dr. J. Kurk, Dr. D. Lutz, Dr. T. Müller, Dr. G. Orban de Xivry, S. Osterhage, Dr. T. Ott, Dr. O. Pfuhl, Dr. A. Poglitsch, Dr. W. Raab, Dr. S. Rabien, Dr. D. Rosario, Dr. A. Schrubba, Dr. E. Sturm, Dr. K. Tadaki, Dr. L. Tacconi, Dr. E. Vilenius, Dr. E. Wisnioski, Dr. E. Wuyts, Dr. S. Wuyts, J. Zanker-Smith.

Doktoranden (D)/Master (M):

L. Fuchs (M.), Y. Futamoto (M.), A. Janssen (D.), A. Karska (D.), P. Lang (D.), M.-Y. Lin (D.) M. Lippa (D.) A. Motello (D.), N. Murillo (D.), P. Plewa (D.), M. Rugel (M.), J. Weber (M.).

*B. Hochenergie-Astrophysik*

Dr. R. Andritschke, Prof. Dr. W. Becker, B. Boller, Prof. Dr. T. Boller, Dr. H. Bräuninger, Dr. M. Brightman, Dr. H. Brunner, Dr. W. Burkert, Dr. V. Burwitz, Dr. S. Carpano, Dr. W. Collmar, Dr. K. Dennerl, Prof. Dr. R. Diehl, Dr. T. Dwelly, Dipl.-Ing. J. Eder, Dr. J. Elliot, V. Emberger, L. Englert, Dr. T. Eraerds, W. Frankenhuizen, Dr. M. Freyberg, Dr. P. Friedrich, Dr. M. Fürmetz, R. Gaida, Dr. A. Georgakakis, Dr. J. Graham, Dr. J. Greiner, Dr. F. Haberl, K. Hartmann, Dipl.-Math. G. Hartner, G. Hauser, Dr. A. von Kienlin, Dr. N. Meidinger, Dr. A. Merloni, Dipl.-Phys. E. Pfeffermann, Dr. M. Porro, Dr. P. Predehl, Dr. A. Rau, Dr. J. Sanders, Dr. S. Savaglio, Dr. P. Schady, Dr. R. Sturm, S. Walther, Dr. G. Weidenspointner, Dr. A. Winter, Dr. X.-L. Zhang.

Doktoranden (D)/Master (M):

A. Bähr (D.), M.G. Bernhardt (D.), J. Buchner (D.), G. Erfanianfar (D.), M. Ghaempanah (D.), F. Hofmann (D.), L.-T. Hsu (D.), P. Hüsemann (M.), G. Khachatryan (D.), F. Knust (D.), P. Maggi (D.), G. Mantovani (D.), B. Menz (D.), M.-L. Menzel (D.), M. Mirkazemi (D.), J. Müller-Seidlitz (D.), T. Prinz (D.), T. Siegert (D.), V. Sudilovsky (D.), M. Tanga (D.), K. Varela (D.), G. Vasilopoulos (D.), A. Weissmann (D.), H.-F. Yu (D.).

*C. Zentrum für Astrochemische Studien*

Dr. F. Alves de Oliveira, Dr. J. Bailey, Dr. N. Bailey, Dr. L. Bizzocchi, Dr. R. Choudhury, Dr. S. Hocuk, Dr. A. Ivlev, Dr. J. Laas, Dr. V. Lattanzi, Dr. J. Pineda Fornerod, Dr. A. Pon, Dr. O. Sipilä, Dr. W. Thi, Dr. A. Vasyunin, Dr. B. Zhao.

Doktoranden (D)/Master (M):

A. Chacon (D.), A. Punanova (D.), Sokolov (D.)

*D. Optische und Interpretative Astronomie*

Dr. A. Beffiori, Dr. A. Bode, Dr. C. Bodendorf, Prof. Dr. H. Böhringer, Dipl. Phys. A. Bohnet, Dr. A. Brucalassi, Dr. P. Erwin, Dr. M. Fabricius, Dr. D. Farrow, Dr. A. Galametz, Dr. N. Geis, Prof. Dr. O. Gerhard, O. Goldenbogen, Dr. F. Grupp, I. Hartung, Dr. U. Hopp, C. Ingram, Dr. R. Katterloher, Dr. J. Koppenhöfer, Dr. C.-H. Lee, Dr. X. Mazzalay, Dr. T. Mendel, Dr. A. Monna, Dr. F. Montesano, Dr. B. Muschielok, B. Niebisch, D. Penka, M. Neumann, F. Raison, Dr. R. Saglia, Dr. A. Sanchez, Dr. J. Snigula, Dr. J. Thomas, Dipl.-Ing. C. Vogel, Dr. C. Wegg, I. Weiss.

Doktoranden (D)/Master (M):

M. Blana (D.), J. Chan (D.), S. Chatzopolous (D.), F. Finozzi (D.), M. Fossati (D.), J. Grieb (D.), S. Kulkarni (D.), M. Lippich (M.) A. Longobardi (D.), M. Opitsch (D.), M. Portail (D.), C. Pulsoni (D.), G. Rosotti (M.), S. Rudkee (M.), S. Salazar-Albornoz (D.), T. Simm (M.), I. Söldner-Rembold (M.), P. Wulstein (D.), J. Zendejas (D.).

*E. Unabhängige Forschungsgruppen*

a) Forschungsgruppe Prof. Dr. A. Burkert

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

Doktoranden (D)/Master (M):

C. Alig (D.), J. Abbellah (D.).

b) Forschungsgruppe Dr. S. Khochfar

Dr. B. Agarwal, Dr. S. Khochfar, Dr. J.-P. Paardekooper.

*F. Ingenieurbereiche und Werkstätten*

a) Elektrotechnik

Dipl.-Ing. S. Albrecht, 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, R. Gressmann, Dipl.-Ing. (FH) O. Hälker, Dipl.-Ing. (FH) O. Hans, M. Hengmith, Dipl.-Ing. (FH) S. Kellner, Dipl.-Ing. (FH) W. Kink, S. Krämer, P. Langer, D. Miefner, Dipl.-Ing. (FH) S. Müller, F. Oberauer, Dipl.-Ing. (FH) S. Ott, Dr. M. Plattner (Leitung), Dipl.-Ing. (FH) C. Rau, Dipl.-Ing. (FH) J. Reiffers, P. Reiss, M. Schneider, F. Schrey, K. Tomic, W. Xu, V. Yaroshenko, J. Zanker-Smith, Dipl.-Ing. (FH) J. Ziegleder.

b) Mechanik

R. Bayer, T. Blasi, A. Brara, B. Budau, S. Czempiel, C. Deysenroth, M. Deysenroth, Dipl.-Ing. (FH) K. Dittrich, G. Dietrich, J. Eibl, P. Feldmeier, 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, S. Huber, H.-J. Kestler, R. Mayr-Ihbe, Dipl.-Ing. (FH) B. Mican, Dipl.-Ing. (FH) S. Paßlack Dipl.-Ing. (FH) A. Pflüger, Dipl.-Ing. (FH) D. Pietschner, M. Plangger, C. Rohe, R. Sandmair, A. Schneider, P. Schnell, C. Schreib, Dr. J. Schubert (Leitung), W. Schunn, S. Senftleben, F. Soller, P. Straube, R. Strecker, Dipl.-Ing. L. Tiedemann.

c) Auszubildende

A. Biber, C. Fischer, M. Hiefinger, H. Kellermann, T. Kratschmann, F. Leimböck, S. Lenzewski, T. Liepold, A. Reinold, D. Schuppe.

*G. Zentrale DV-Gruppe*

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

*H. Öffentlichkeitsarbeit*

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

*I. Publikationsunterstützung*

R. Hauner, R. Mayr-Ihbe, B. Mory.

*J. Bibliothek*

E. Blank, E. Chmielewski, C. Hardt.

### *K. Verwaltung und Allgemeine Dienste*

C. Altinger, G. Apold, A. Arturo, T. Bauer, M. Bauernfeind, U. Bitzer, U. Cziasto, E. Doll, C. Eicher, M. Ertl, S. Goldbrunner, M. Grasmann, M. Grohmann, H.-P. Gschnell, P. Hingerl, M. Ihle (Leitung), I. Inhofer, T. Jäkel, J. Jirsch, W. Karing, M. Keil, L. Kestler, V. Kliem, E. Kuhwald, E. Maier, L. Mayer, A. Nagy, A. Neun, J. Paschou, M. Peischl, C. Preisler, A. Reither, R. Rochner, E. Rossa, P. Sandtner, B. Scheiner, S. Schwaiger, B. Seyfarth, R. Steinle, L. Thiess, J. Vogt.

### 2.2 Gäste

Im Jahr 2014 besuchten 49 Gastwissenschaftler das MPE, mit Besuchszeiten von einigen Tagen bis zu einigen Monaten.

## 3 Preise, Auszeichnungen, Berufungen

Burtscher, L.: DFG Priority Programme Grant SPP 1573, DFG, Bonn, Deutschland, September 2014.

Genzel, R.: Herschel Medal, Royal Astronomical Society, London, Großbritannien, Juni 2014.

Genzel, R.: Order pour le Mérite for Sciences and Arts (OPLM), Bonn, Deutschland, Juni 2014.

Genzel, R.: Großes Verdienstkreuz mit Stern des Verdienstordens der BRD, Berlin, Deutschland, Oktober 2014.

Genzel, R.: Honorary Doctorate, Paris Observatory (OBSPM), Paris, Frankreich, November 2014.

Kanbach, G.: Adjunct Professor, University College Dublin, School of Physics, Dublin, Irland, Juni 2014.

Pon, A.: J.S. Plaskett Gold Medal, Canadian Astronomical Society, Kanada, Juni 2014.

Pon, A.: Governor General's Gold Medal, University of Victoria, Victoria, Kanada, Juni 2014.

van Dishoeck, E.: Induction Leopoldina Academy of Sciences, Halle, Deutschland, März 2014.

van Dishoeck, E.: Lise Meitner Award in Physics, Gothenburg, Schweden, September 2014.

## 4 Lehrtätigkeit, Prüfungen und Gremientätigkeit

### 4.1 Lehrtätigkeiten

Becker, W.: Astrophysikalisches Doktorandenseminar mit den Studenten der *International Max-Planck Research School on Astrophysics*, LMU München WS 13/14, SS 14, WS 14/15; Endstadien der Sternentwicklung, LMU München SS 14.

Bender, R.: Astronomisches Kolloquium, LMU München WS 13/14, SS 14, WS 14/15; Astrophysikalisches Grundpraktikum, LMU München WS 13/14, SS 14, WS 14/15; Forschungsprojekt Masterarbeit, Anleitung zum wissenschaftlichen Arbeiten, LMU München WS 13/14, SS 14, WS 14/15; Grundlagen der fortgeschrittenen Astrophysik (Essential of Advanced Astrophysics), LMU München WS 13/14, SS 14, WS 14/15; Ergänzung zur Vorlesung „Grundlagen der fortgeschrittenen Astrophysik“, LMU München WS 13/14, SS 14, WS 14/15; Astrophysikalisches Hauptseminar theoretisch und numerisch orientiert, „Tools in modern astrophysics“, LMU München WS 13/14, SS 14, WS 14/15; Begleitendes Kolloquium zum Astrophysikalisches Hauptseminar theoretisch und numerisch orientiert, LMU München WS 13/14, SS 14, WS 14/15; Astrophysikalisches Hauptseminar experimentell und beobachtungsorientiert, „Tools in modern astrophysics“, LMU München WS

13/14, SS 14, WS 14/15; Begleitendes Kolloquium zum Astrophysikalisches Hauptseminar experimentell und beobachtungsorientiert, LMU München WS 13/14, SS 14, WS 14/15; Projektseminar mit begleitendem Kolloquium „Extragalactic group seminar“, LMU München SS 14; Projektseminar mit begleitenden Kolloquium „Gravitational lensing“, LMU München WS 13/14, SS 14; Projektseminar mit begleitenden Kolloquium „Galaxies“, LMU München WS 13/14, SS 14, WS 14/15; Projektseminar mit begleitenden Kolloquium aus dem Bereich experimenteller Arbeiten und Instrumentenentwicklung in der Astronomie, LMU München WS 13/14, SS 14, WS 14/15; 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 13/14, SS14, WS 14/15; 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 13/14, SS 14, WS 14/15; Galaxies, Vorlesung, LMU München WS 14/15; Ergänzung zur Vorlesung „Galaxies“, LMU München WS 14/15.

Boller, Th.: Vertiefung zur Vorlesung Einführung in die Astrophysik, Goethe-Universität Frankfurt SS 14; AGN-Physik, Goethe-Universität Frankfurt WS 14/15.

Diehl, R.: Astrophysics Seminar „Nuclei in the Cosmos“, TU München WS 13/14, SS 14, WS 14/15 (mit Dozenten vom MPE, MPA, LMU, TU); Observational High-Energy Astrophysics, TU München SS 14.

Eisenhauer, F.: Einführung in die Astrophysik, TU München WS 13/14, WS 14/15; High Angular Resolution Astronomy: Telescopes, Adaptive Optics, Interferometry, and more, TU München SS 14.

Gillessen, S.: Astrophysical Seminar, LMU München WS 13/14, SS 14, WS 14/15.

Krause, M.: Dynamik des Interstellaren Mediums, LMU München WS 13/14; Probestudium, LMU München WS 14/15.

Müller, T.: Astronomie, und Kosmologie: Kleinplaneten und Sonnensystem, Lehrerakademie Dillingen SS 14; Physik/Astronomie: Kleinkörper im Sonnensystem, Lehrerakademie Dillingen WS 14/15.

Saglia, R.: Grundlagen der fortgeschrittenen Astrophysik (Essentials of Advanced Astrophysics), LMU München WS 14/15 (mit R. Bender).

## 5 Wissenschaftliche Arbeiten

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, (2) Optische und Interpretative Astronomie, (3) Hochenergieastrophysik und (4) Zentrum für Astrochemische Studien. Diese vier Arbeitsbereiche, sowie noch zusätzlich zwei unabhängige Forschungsgruppen, beschäftigen sich – oft bereichsübergreifend – mit unseren sechs großen Forschungsthemen (siehe „Einleitung“). Unsere Wissenschaft 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.

## 6 Akademische Abschlussarbeiten

### 6.1 Bachelorarbeiten

*Abgeschlossen:*

Bauer, L.: Alternatives to supermassive black holes in the center of several galaxies. Ludwig-Maximilians-Universität München 2014.

Bodensteiner, J.: High resolution spectroscopy of three evolved massive stars with mid-infrared circumstellar nebulae. Technische Universität München 2014.

Graeff, D.: Messung der Masse des Schwarzen Loches in LMC X-3. Technische Universität München 2014.

Huber, A.: Maser emission as a probe of the masses of black holes at the centers of galaxies. Ludwig-Maximilians-Universität München 2014.

Neri, G.: Charakterisierung eines galaktischen Röntgendoppelsternsystems mit hochauflösender optischer Spektroskopie. Technische Universität München 2014.

Prechtel, M.: Vermessung der Strahlhomogenität an der PANTER Röntgentestanlage. Technische Universität München 2014.

## 6.2 Masterarbeiten

### *Abgeschlossen:*

Fuchs, L.: Galaxy structure in color: constraints on resolved stellar populations in distant galaxies. Technische Universität München 2014.

Lutz, K.: Accretion and stellar mass growth in low mass galaxies. Technische Universität München 2014.

Müller, F.: Development of a fiber based integral field unit and derivation of the instrumental response function of an existing integral field unit. Ludwig-Maximilians-Universität München 2014.

Plewa, P. M.: The Location of Sgr A\*: Improving the Infrared Astrometric Frame for the Galactic Center by Correcting for Image Distortion. Ludwig-Maximilians-Universität München 2014.

## 6.3 Dissertationen

### *Abgeschlossen:*

Brucalassi, A.: Search for extra-solar planets with high precision radial velocity curves. Ludwig-Maximilians-Universität München 2014.

Großberger, C.: New Developments and Techniques in Radio to X-ray observations of AGN. Friedrich-Alexander-Universität Erlangen-Nürnberg 2014.

Karska, A.: Feedback from deeply embedded low- and high-mass protostars: surveying hot molecular gas with Herschel. MPE/Leiden University 2014.

Orban de Xivry, G.: The ARGOS Wavefront Sensor Detector and Computer, and the Black Hole Growth of Narrow-Line Seyfert 1 Galaxies. Ludwig-Maximilians-Universität München Munich 2014.

Zendejas Dominguez, J.: Searching for transits in the WTS with the difference imaging light curves. Ludwig-Maximilians-Universität München 2014.

## 7 Tagungen, Projekte am Institut und Beobachtungszeiten

### 7.1 Tagungen und Veranstaltungen

*The Early Life of Stellar Clusters: Formation and Dynamics*, Copenhagen, Denmark, 3.11. - 7.11.2014, Organisation: S. Dib, S. Hocuk, P. Padoan, S. P. Zwart, S. Pfalzner, B. Ercoleo, I. Pelupessy, T. Haugbolle..

*Exoplanet Observations with the E-ELT 2014*, Garching, Germany, 3.2. - 6.2.2014, Organisation: B. Brandl, G. Chauvin, R. Davies, A.-M. Lagrange, M. Meyer, J. Melnick, C. Melo, D. Queloz, I. Snellen, J. Spyromilio, M. Thatte.

*Speed and Sensitivity: Expanding Astronomical Horizons with the E-ELT*, Galway, Ireland, 13.5. - 16.5.2014, Organisation: I. Hook, A. Shearer, V. Dhillon, A. Slowikowska, R. Mignani, R. Davies, R. Haynes, S. Ramsay.

*The Unquiet Universe*, Cefalu, Sicily, Italy, 3.6. - 7.6.2014, Organisation: D. Burgarella, F. Combes, R. Davies, J. Dunlop, M. Elvis, F. Fiore, E. Giallongo, M. Haehnelt, P. Madau, E. Piconcelli, A. Grazian.

*The Fate of Gas in Galaxies: AGN vs Star Formation*, Durham, UK, 28.7. - 1.8.2014, Organisation: D. Alexander, R. Hickox, T. Theuns, A. Alonso-Herrero, F. Bournaud, R. Davies, R. Morganti, J. Mullaney, R. Somerville.

*3D2014: Gas and Stars in Galaxies: A Multiwavelength 3D Perspective*, Garching, Germany, 10.3. - 14.3.2014, Organisation: M. Bershadsky, M. Cappellari, F. Combes, C. De Breuck, E. Emsellem, N.M. Förster Schreiber, D. Iono, H. Kuntschner, A. Peck, S. Ramsay, B. Koribalski, M. Swinbank, J. Vernet, F. Walter, L. Wisotzki, M. Zwaan.

*IAU Symposium 311 - Galaxy Masses as Constraints of Formation Models*, Oxford, United Kingdom, 21.7. - 25.7.2014, Organisation: M. Cappellari, S. Courteau, R. Bacon, J. Bland-Hawthorn, A. Brooks, K. Bundy, C. Conroy, G. De Lucia, N.M. Förster Schreiber, C. Maraston, A. Saintonge, A. Shapley, T. Treu, I. Trujillo, F. van den Bosch, S. Yi.

*Star Formation Across Space and Time*, ESA-ESTEC, The Netherlands, 11.11. - 14.11.2014, Organisation: P. André, S. Eales, D. Elbaz, B. Elmegreen, N. Evans, Y. Fukui, E. Ostriker, G. Pilbratt, N. Scoville, L. Tacconi.

*Revolution in Astronomy with ALMA – The Third Year*, Tokyo, Japan, 8.12. - 11.12.2014, Organisation: P. Andreani, A. Bolatto, J. Carpenter, S. Casasus, S. Corder, P. Cox, F. Combes, T. Hasegawa, J. Hibbard, S. Iguchi, D. Iono, R. Ivison, K. Johnson, J. Kim, S.-Y. Liu, J. Martin-Pintado, R. Moreno, K. Motohara, R. Neri, L. Nyman, N. Ohashi, T. Oka, R. Plambeck, D. Scott, L. Tacconi, K. Tatematsu (Chair), L. Testi, H. van Langevelde, A. Wootten .

*Superbubbles, HI holes and Supershells*, Freising, Germany, 10.11. - 12.11.2014, Organisation: M.G.H. Krause, R. Diehl, D. Breitschwerdt, E. Brinks, R.-J. Dettmar, D. Bomans, M. Sasaki.

*Splinter meeting J, “The interstellar medium“*, Astronomische Gesellschaft, Bamberg, Germany, 25.9.2014, Organisation: M.G.H. Krause, R. Diehl, A. Burkert, M. Gritschneider, M. Schartmann.

*Water in Star-forming Regions with Herschel*, Rome INAF Observatory, Frascati, Italy, 22.10. - 24.10.2014, Organisation: E.F. van Dishoeck, B. Nisini.

*Episodic accretion: Oort workshop 2014*, Leiden, the Netherlands, 13.5. - 15.5.2014, Organisation: N.J. Evans, E.F. van Dishoeck.

*Dense Cores: Origins, Evolution and Collapse*, Monterey, USA, 27.7. - 30.7.2014, Organisation: S. Stahler, P.C. Myers, P. Caselli, G. Fuller, M. Tafalla.

*Filamentary Structure in Molecular Clouds*, NRAO Charlottesville Headquarters, Virginia, USA, 10.10. - 11.10.2014, Organisation: F. Lo, C. Brogan, P. Caselli, N. Evans, D. Di Francesco, P. Goldsmith, M. Heyer, Z-Y Li, L. Mundy, P. Myers, E. Ostriker, J. Ott, E. Vazquez.

*IAU Symposium 311: Galaxy Masses as Constraints of Formation Models*, Oxford, UK, 21.07. - 25.07.2014, Organisation: S. Aalto, L. Blitz, L. Bronfman, P. Caselli, F. Combes, Y. Fukui, G. Helou, P. Ho, R. Kennicutt, C. Lonsdale, F. Walter, L. Young, M. Yun.



## 7.2 Projekte und Kooperationen mit anderen Instituten

### Australien

Australian National University: Galaxienentstehung.

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; SPICA/SAFARI.

### Brasilien

Observatorio Nacional, Rio: DES.

Centro Brasileiro de Pesquisas, Rio: DES.

Universidade Federal do Rio: DES.

Universidade de Sao Paulo: Galaxienentstehung.

### Canada

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

NRC - Herzberg, Ottawa: Turbulence; superbubbles; First Hydrostatic Cores (FHSCs).

University of Alberta, Edmonton (Alberta): Turbulence.

University of Calgary: Turbulence.

University of Victoria, Victoria: Turbulence; superbubbles; First Hydrostatic Cores (FHSCs).

University of Waterloo, Waterloo: Herschel HIFI.

University of Western Ontario, London (Ontario): Turbulence.

### Chile

Universidad de Concepcion: Röntgen-Doppelsternsysteme.

Universidad Catolica Santiago: Röntgen-Doppelsternsysteme.

### China

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

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

### Deutschland

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

DLR-Köln Porz: Rosetta lander (Philae).

European Southern Observatory (ESO), Garching: KMOS Multiobjekt-Spectrograph für VLT; GRAVITY; Galaxienentstehung; ASTRO-WISE; OmegaCAM; MICADO; Nukleare Astrophysik; ERIS; Black Hole Cam; Infrared Dark Clouds.

Fraunhofer Institut für Mikroelektronische Schaltungen und Systeme, Duisburg: Mikroelektronikentwicklungen; CAMEX 64B; JFET-CMOS Prozessor; ATHENA; eROSITA.

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 Materialphysik im Weltraum, Köln: Glasübergänge.

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

Laser Zentrum Hannover: Development of advanced Filters for MICADO; coatings for Gravity; dichroics for ARGOS.

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

Maier-Leibnitz Laboratorium, Garching: eROSITA.

Max-Planck-Institut für Astronomie, Heidelberg: GRAVITY; LUCI; Herschel-PACS; Pan-STARRS; SDSS; ARGOS; MICADO; EUCLID.

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

Max-Planck-Institut für Biomedizinische Forschung, Heidelberg: CFEL.

Max-Planck-Institut für Biophysikalische Chemie, Göttingen: CFEL.

Max-Planck-Institut für Kernphysik, Heidelberg: CFEL.

Max-Planck-Institut für Komplexe System, Fritz-Haber Institut, Dresden: CFEL.

Max-Planck-Institut für Physik, Werner Heisenberg Institut, München: MPI Halbleiterslabor, Entwicklung von CCDs; Active Pixeldetektoren (APS); JFET-Elektronik und Drift-detektoren für den Röntgenbereich; CAST; eROSITA.

Max-Planck-Institut für Radioastronomie, Bonn: ARGOS; Black Hole Cam; Molecular Clouds; Turbulence.

Physikalisch-Technische Bundesanstalt Berlin: eROSITA, SPICA-SAFARI, TES Bolometer SQUID-Ausleseschaltung.

Thüringer Landessternwarte Tautenberg: GROND; Gamma-Ray Bursts.

Technische Universität Berlin: Interstellares Medium.

Technische Universität Darmstadt: CAST.

Technische Universität München: Nukleare Astrophysik.

Trans MIT, Gießen: Pulse tube cooler for GRAVITY.

Universität Bochum: LUCI.

Universität Bonn: Test von Pixeldetektoren für ATHENA; ASTRO-WISE; eROSITA, EUCLID.

Universität Düsseldorf: ERC Advanced Grant.

Universität Erlangen (ECAP): eROSITA, ATHENA.

Universität Hamburg: eROSITA; OPTIMA (Flarestars).

Universität Heidelberg: ATHENA; XFEL.

Universität Jena: Isolierte Neutronensterne; Nukleare Astrophysik.

Universität Köln: Galaktisches Zentrum; GRAVITY.

Universität Mannheim: ATHENA; XFEL.

Universität Würzburg: AGADE.

Frankreich

CEA, Saclay: INTEGRAL-Spektrometer SPI; Herschel-PACS; CAST; EUCLID; SPICA; SVOM; Molecular Clouds; ATHENA.

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

IAP Paris: Nukleare Astrophysik.

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

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

IPAG Grenoble: GRAVITY; Astrochemistry.

OAMP Marseille: Herschel-PACS.

Observatoire de Paris-Meudon: GRAVITY; MICADO.

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.

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

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

SKA Organisation, Jodrell Bank Observatory, Manchester: First Hydrostatic Cores.

University of Cambridge: DES.

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

University of Durham: KMOS; PanSTARRS.

University of Edinburgh: DES; KMOS; PanSTARRS.

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.

University Oxford: KMOS.

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

Irland

National University of Ireland, Galway: High Time Resolution Astronomy.

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; ATHENA.  
 IFCAI-CNR Palermo: XMM-Newton Beobachtungen von Neutronensternen und Pulsaren.  
 INAF (Insituto Nazionale di Astrofisica): ATHENA.  
 INAF Arcetri: ARGOS; LBT.  
 INAF Padua: Herschel-PACS; MICADO; LBT.  
 INAF Roma: LBT; Nukleare Astrophysik.  
 INAF Trieste: Gamma-Ray Bursts; Fermi/LAT.  
 INFR Frascati: SIDDHARTA.  
 Istituto di Fisica dello Spazio Interplanetario (CNR), Frascati: Herschel-PACS.  
 OAA/LENS Firenze: Herschel-PACS.  
 Politecnico di Milano: rauscharme Elektronik; Röntgendetektorenentwicklung.  
 University Bologna: EUCLID.

### Japan

ISAS, Sagamihara: SPICA-SAFARI.  
 Tokio Institute of Technology (TITECH), Ookayama: ASCA/XMM-Newton Beobachtungen von AGN.  
 University of Osaka: Astro-H.

### Kroatien

Ministry of Science and Technology, Zagreb: CAST.

### Niederlande

ESTEC, Noordwijk: XMM-Newton-TS-Spiegelkalibration; CCD Entwicklung; Radiation Performance Instrument; INTEGRAL; EUCLID.  
 NOVA Leiden: MICADO.  
 Radboud University, Nijmegen: Black Hole Cam.  
 SRON Groningen: SPICA-SAFARI.  
 SRON, Utrecht: Chandra-LETG; TES für SPICA.  
 University of Groningen, Kapteyn Institute: Rekonstruktion der Dichteverteilung im Universum; EUCLID; Dynamical-Chemical Models.

### Österreich

Universität und TU Wien: Herschel-PACS; MICADO; ATHENA.  
 Universität Innsbruck: MICADO.  
 Universität Linz: MICADO.

### Polen

Nicolaus Copernicus (ZAMK), Torun: Pulsars Astronomical Centers; ATHENA.  
 University Zielona Gora: OPTIMA.

### Portugal

SIM Lissabon: GRAVITY.

### Russland

Staatliche Technische Universität Bauman, Moscow: Stark gekoppelte Systeme, Time-domain spectroscopy.

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

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

#### 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.

#### Spanien

Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas: DES.

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

Instituto de Astrofisica de Canarias (IAC), Laguna: Herschel-PACS.

Instituto de Ciencias del Espacio, Bellaterra: DES.

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

Universität Valencia, Department de Astronomia, Valencia: INTEGRAL-Spektrometer SPI.

Universidad de Zaragoza: CAST.

Observatorio Astronomico de Mallorca: Novae; Kometen.

#### Taiwan

National Central University, Chungli: PanSTARRS.

#### Türkei

Bogazici University, Istanbul: CAST.

#### Ungarn

Konkoly Observatory: Herschel-PACS.

#### USA

Argonne National Laboratory: DES.

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.

Johns Hopkins University: PanSTARRS.

Joint Astronomy Center, Hilo (Hawaii): Turbulence and superbubbles.

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

NOAO, Tucson: DES.

NASA/Ames Research Center, Mofett Field (CA): MHD shocks.

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

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.

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

Space Telescope Science Institute, Baltimore: Galaxienentstehung; PanSTARRS; Turbulence.

Stanford/SLAC: CAMP, DES.

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; SOHO/CELIAS; Planetenentstehung; LBT; ARGOS.

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

University of California, Santa Cruz: DES.

University of Chicago: DES.

University of Colorado, Boulder (Co): Superbubbles.

University of Florida, Gainesville (Fl): Infrared Dark Clouds.

University of Illinois at Urbana-Champaign: FIFI-LS; DES.

University of Michigan: DES.

University of Pennsylvania: DES.

University of Pittsburgh: Galaxienentstehung.

University of Texas, Austin: Galaxienentstehung; HETDEX; Turbulence.

University of Toledo: Galaxienentstehung.

### 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; 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.

Black Hole Cam ERC Synergy Grant: ESO Garching, MPI für Gravitationsphysik, MPI für Radioastronomie, Germany; Radboud University, JIVE Dwingeloo, The Netherlands.

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/Saclay DAPNIA/SED, France; Pacific Northwest National Laboratory, Richland, USA.

CDFS – The Chandra Deep Field South: ESO Garching, Astrophysikalisches Institut Potsdam, Germany; IAP Paris, France; Osservatorio Astronomico Trieste; Istituto Nazionale di Fisica Nucleare Trieste, Italy; Associated Universities Washington, Johns Hopkins University Baltimore, Space Telescope Science Institute Baltimore, USA; Center for Astrophysics Hefei, China.

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, Università Padova, Dipartimento di Fisica, Università degli Studi Roma Tre, Italy; Harvard-Smithsonian Centre for Astrophysics, Cambridge, Department of Physics, Carnegie Mellon University, Pittsburgh, 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 de Pesquisas Fisicas, Universidade Federal do Rio, Brasilien; Instituto de Ciencias dei Espacio, Institut de Fisica d’Altes Energies, Centro de Investigaciones Energeticas Medioambientales y Tecnológicas, Spain.

ERIS – Enhanced Resolution Imager and Spectograph for the VLT: ESO, Germany; ETH Zürich, Schweiz.

eROSITA – extended ROentgen Survey with an Imaging Telescope Array: Universität Tübingen, AIP Potsdam, 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 Nazionale di Fisica Nucleare Trieste, Italy; University of Tokyo, Japan; CEA Saclay, France.

FP7 Opticon JRA1 - Adaptive Optics: INAF Padova, INAF Arcetri, Italy; LAM Marseille, LAOG Grenoble; LESIA Paris, ONERA Paris, France; KIS Freiburg, MPIA Heidelberg, Germany; NOVA Leiden, The Netherlands; UKATC Edinburgh; University Durham, UK.

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.

Herschel/PACS – Herschel/Photodetector Array Camera and Spectrometer: CSL Liège, Katholieke Universiteit Leuven, Belgium; MPIA Heidelberg, Universität Jena, Germany; OAA/LENS Firenze, IFSI Roma, OAP Padova, Italy; IAC La Laguna, Spain; Universität und TU Wien, Austria; IGRAP Marseilles, CEA Saclay, France; Konkoly Observatory, Hungary.

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 Southampton, 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.

KMOS – A VLT multi-IFU near-infrared spectrograph: Universitätssternwarte München, Germany; University of Durham, ATC Edinburgh, University of Oxford, Bristol University, University of Oxford, UK.

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; Osservatorio Astrofisico di Arcetri Firenze, Italy.

Lockman Hole, optical/NIR identifications: Astrophysikalisches Institut Potsdam, ESO Garching, Germany; Istituto di Radioastronomia del CNR Bologna, Italien; Associated Universities Washington, California Institute of Technology Pasadena, Institute for Astronomy Honolulu, Princeton University Observatory, Pennsylvania State University Park, USA; Subaru Telescope NAO Hilo, Japan.



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

MICADO – Multi-Adaptive Optics Imaging Camera for Deep Observations: LMU, USM, MPIA, IFA Göttingen, Germany; INAF Padova, Italy; Austrian Universities astronomy cooperation (Wien, Innsbruck, Linz), Austria; NOVA, Federation of Dutch University Astronomy Departments, The Netherlands; LESIA 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.

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.

SPICA/SAFARI – SPace Infrared telescope for Cosmology and Astrophysics/SpicA FAR-infrared Instrument: University of Tokyo, ISAS/JAXA, Sagamihara, Nagoya University, Japan; SRON, Groningen, TU Delft, The Netherlands; RAL, Dittcot, University of Cardiff, Cambridge University, UK; University of Geneva, ETH Zürich, Switzerland; CEA Grenoble, CESR Toulouse, Sap-CEA Saclay, LAM, Marseille, France; University of Vienna, Austria; MPIA, Heidelberg, PTB, Berlin, Germany; CAB-INTA, Madrid, Spain; IFSI-INAF, Rome, Italy; KU Leuven, Belgium; University of Lethbridge, Canada; NUI Maynooth, Ireland.

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.

af inventions, Braunschweig: FPGA programmierung for eROSITA.

Array Electronics, Egmanting: DAQ development OPTIMA.

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

Bonerz engineering, Weiler-Simmerberg: Platinenentwicklung, Elektronikentwicklung.

Buchberger GmbH, Tuchenbach: Fertigung Strukturteile für PANTER-Manipulatore.

Cryovac, Troisdorf: Cryostat for SPICA-SAFARI detector assembly tests.

ESL GmbH, Berlin: Fertigung von Leiterplatten.

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

Guido Lex Werkzeugbau GmbH, Miesbach: Strukturteile für LUCI; eROSITA.

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

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

IABG, Ottobrunn: Umgebungs-Tests eROSITA.

Ingenieurbüro Buttler, Essen: Front-End Elektronikentwicklung für ATHENA und eROSITA.

Ingenieurbüro Josef Eder, Hilgertshausen: System Engineering for eROSITA; GRAVITY.

Ingenieurbüro pfma, Haar-Salmdorf: SAFARI.

Ingenieurbüro Weisz, München: Design und Konstruktion für LUCI und ERIS.

Invent GmbH, Braunschweig: CFRP-Telescopestructure for eROSITA.

IRIDIAN Spectral Technologies, Ottawa, Canada: Fitters for ERIS Spectrometer.

Korth Kristalle GmbH, Kiel: Lenses for ERIS Spectrometer.

Kugler GmbH, Salem: GRAVITY.

Laserjob GmbH, Grafrath: Entwicklung Röntgenbaffle für eROSITA.

Luxel Corporation, USA: Filter for eROSITA.

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

MBM Maschinenbau, Mühlldorf: eROSITA Container.

MENLO Systems, Martinsried, Germany: Metrology Laser for GRAVITY.

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

Oxford Instruments, UK: Sub-Kelvin Kühler für SPICA-Safari.

PNSensor, München: Entwicklung und Fertigung von Halbleiterdetektoren; Montage von Halbleiterdetektorsystemen; ARGOS.

RUAG Austria: Teleskop-Deckel-Mechanismus für eROSITA.

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

TransMIT, Giessen, Germany: pulse tube cooler for GRAVITY.

WINLIGHT OPTICS, Pertuis, France: Beam analyzer optics for GRAVITY.

ZÜND Precision Optics, Diepoldsau, Switzerland: roof prisms for GRAVITY.

## 8 Veröffentlichungen

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#### 8.4 Bücher

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#### 8.5 Populärwissenschaftliche und sonstige Veröffentlichungen

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#### 8.6 Vorträge, Astronomische Telegramme und Zirkulare, Poster

Mitarbeiter des MPE hielten im Jahr 2014 insgesamt 306 Vorträge auf Konferenzen, bei Seminaren und Kolloquien und in der Öffentlichkeitsarbeit im In- und Ausland. Zusätzlich haben sie an insgesamt 88 astronomischen Telegrammen, Zirkularen und Datenkatalogen mitgewirkt und 20 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.

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

Tabelle 1: Vorträge, Telegramme/Zirkulare und Poster

Arbeitsgruppe	Vorträge	Telegramme, Zirkulare	Poster
Infrarot-/Submillimeter-Astronomie	148 (102))	6 (0)	8
Optische & Interpretative Astronomie	29 (23)	9 (3)	2
Hochenergieastrophysik	103 (57)	72 (29)	5
Zentrum Astrochemische Studien	21 (13)	0 (0)	5
Unabhängige Forschungsgruppen	0 (0)	1 (0)	0

„Forschung/Veröffentlichungen“ eingesehen werden.

## 9 Öffentlichkeitsarbeit

Das MPE engagierte sich auch in der Öffentlichkeitsarbeit. Im Jahr 2014 hielten MPE-Wissenschaftler 21 populärwissenschaftliche Vorträge (z.B. an Schulen, Planetarien, bei Astronomischen Vereinigungen). Bei 28 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, 15 Schüler/innen erhielten in ein- oder zweiwöchigen Praktika und 5 Hochschüler in mehrwöchigen Praktika einen Einblick in die Arbeitswelt von Astrophysikern.

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

Reinhard Genzel