

# Garching

## Max-Planck-Institut für extraterrestrische Physik

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### 0 Allgemeines

Das Max-Planck-Institut für extraterrestrische Physik (MPE), gegründet 1963, befaßt sich mit Themen der Astrophysik und Plasmaphysik, die sich fünf großen Bereichen zuordnen lassen: (i) *Großräumige Struktur und Kosmologie*, (ii) *Galaxien und Galaxienentwicklung*, (iii) *Massive Schwarze Löcher und Aktive Galaxien*, (iv) *Sternentwicklung und Interstellares Medium* und (v) *Komplexe Plasmen*. 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. Ergänzt werden unsere Untersuchungen durch Experimente im Labor.

Methodisch lassen sich die Forschungsaktivitäten des MPE in mehrere Bereiche einteilen. In den astrophysikalischen Forschungsbereichen wird die Strahlung entfernter Objekte mit Teleskopen in den Millimeter/Sub-millimeter-, Infrarot-, Optischen-, Röntgen- und Gammastrahlungsbereichen gemessen. Der hierbei überdeckte Teil des elektromagnetischen Spektrums umfasst mehr als zwölf Dekaden. Die untersuchten Objekte reichen von Kometen bis zu den fernsten Quasaren, von den winzigen Neutronensternen bis zu Galaxienhaufen, den größten bekannten Formationen im Kosmos. Seit der Entdeckung eines neuen Plasmazustandes ("Plasmakristall") hat sich noch das Forschungsfeld "Komplexe Plasmen" aufgetan, das hauptsächlich in Laborexperimenten betrieben wird. Um die Gravitation "auszuschalten" werden inzwischen auch Experimente auf Parabelflügen und auf der Internationalen Raumstation durchgeführt. Die Theoriegruppe des Instituts beteiligt sich Gruppen-übergreifend an der Interpretation der Beobachtungen und Messungen. Die direkte Wechselwirkung von Beobachtern, Experimentatoren und Theoretikern im Hause ist ein Markenzeichen unseres Arbeitsstils und führt oft im direkten Wechselspiel von Hypothesen und neuen Beobachtungen zu einer frühen Erkennung vielversprechender neuer Forschungsrichtungen.

Zwei technologische Einrichtungen des MPE sind von besonderer Bedeutung: Die 130 m lange Vakuumanlage *Panther* zum Test von Röntgenteleskopen in Neuried bei München und das zusammen mit dem Max-Planck-Institut für Physik betriebene *Halbleiterlabor* in München-Neuperlach, in dem Strahlungsdetektoren für unsere Raumfahrtexperimente entwickelt werden. Auch durch diese Einrichtungen gewinnt der Transfer von neuen

Verfahren und Methoden in die industrielle Anwendung immer mehr an Bedeutung. Besonders hervorzuheben sind dabei ein weiter Bereich von Anwendungen für die von uns entwickelten Strahlungsdetektoren, die erfolgreiche Verwendung mathematischer Methoden der nichtlinearen Dynamik in der Medizin, sowie die Anwendungen der Plasmaphysik auf die Medizin.

Neben der Forschung nimmt unser Institut auch universitäre Ausbildungsaufgaben wahr. MPE-Wissenschaftler sind als Hochschullehrer an mehreren Universitäten tätig und betreuen studentische Forschungsprojekte (Diplom- 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 unseren und angrenzenden Forschungsgebieten, häufig in Zusammenarbeit mit Universitätsinstituten. Unsere sehr erfolgreiche "International Max-Planck Research School 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, die Europäische Südsternearte, sowie Forschergruppen aus der TU München beteiligt.

## 1 Personal und Ausstattung

### 1.1 Personalstand

#### *Direktoren und Professoren:*

Prof. Dr. R. Genzel (Geschäftsführung), Infrarot- und Submillimeter-Astronomie; Prof. Dr. R. Bender, Optische und Interpretative Astronomie; Prof. Dr. K. Nandra, Hochenergie-Astrophysik; Prof. Dr. G. Morfill, Theorie und komplexe Plasmen; Prof. Dr. G. Haerendel (emeritiert); Prof. Dr. R. Lüst (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. 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).

#### *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, Verkehr und Technologie, München); Prof. Dr. B. Huber (Rektor der LMU München); Dr. M. Mayer (ehemaliges Mitglied des Bundestages, Höhenkirchen); Min.Dir. L. Meyer (Bundesministerium für Wirtschaft und Technologie, Berlin); Prof. Dr. E. Rohkamm (Blohm & Voss GmbH, Hamburg).

#### *Fachbeirat:*

Prof. Dr. R. Davies (Oxford University, UK); Prof. Dr. R. Ellis (CALTECH, USA); Dr. N. Gehrels (NASA GSFC, USA); Prof. Dr. F. Harrison (CALTECH, USA); Prof. Dr. O. Havnes (Trømsø University, Norwegen); Prof. Dr. P. Léna (Université Paris VII, Frankreich); Prof. Dr. R. McCray (University of Colorado, USA); Prof. Dr. M. Salvati (Osservatorio Astrofisico di Arcetri, Italien).

*Sonderfachbeirat (CIPS):*

Prof. Dr. H. Gleiter (Forschungszentrum Karlsruhe, Deutschland); Prof. Dr. R. Sauerbrey (Forschungszentrum Rossendorf, Dresden, Deutschland).

*Wissenschaftliche Mitarbeiter und Angestellte**A. Infrarot-und Sub-mm-Astronomie*

Dr. N. Ageorges, A. Agudo Berbel, Dr. H. Bartko, Dr. S. Berta, Dr. J. Brown, Dr. S. Bruderer, Dr. A. Contursi, Dr. R. Davies, Dr. V. Doublier Pritchard, Dr. F. Eisenhauer, Dipl.-Phys. H. Feuchtgruber, Dr. N. Förster Schreiber, Dr. N. Geis, H. Gemperlein, Dr. S. Gillessen, Dr. J. Grácia Carpio, A. Gräter, S. Harai-Ströbl, Dr. G. Herczeg, Dr. R. Hofmann, Dr. S. Kanneganti, Dr. R. Katterloher, A. Kleiser, H. Krombach, Dr. J. Kurk, Dr. D. Lutz, Dr. B. Magnelli, Dr. T. Müller, Dr. R. Nordon, S. Osterhage, Dr. A. Poglitsch, Dr. P. Popesso, Dr. W. Raab, Dr. S. Rabien, Dr. D. Rosario, Dr. A. Saintonage, Dr. E. Sturm, Dr. L. Tacconi, Dr. E. Vilenius, Dr. M. Wetzstein, Dr. S. Wuyts, J. Zanker-Smith.

*Doktoranden/Diplomanden/Master:*

Y. Boose, P. Buschkamp, K. Dodds-Eden, H. Engel, T. Ertl, W. Fabian, T. Fritz, S. Genel, J. Jaffe, A. Karska, C. Kistler, D. Moch, G. Orban di Xivry, O. Pfuhl, L. Prade, L. Shao, Ü.-R. Soylu.

*B. Hochenergieastrophysik*

Dr. R. Andritschke, Dr. I. Balestra, Prof. Dr. W. Becker, B. Boller, Prof. Dr. T. Boller, Dr. A. Bongiorno, Dr. E. Bottacini, Dr. H. Bräuning, B. Bribian-Sanchez, Dr. M. Brightman, Dr. H. Brunner, Dr. M. Brusa, Dr. W. Burkert, Dr. V. Burwitz, Dr. N. Cappelluti, Dr. W. Collmar, Dr. G. Coppa, Dr. K. Dennerl, Dr. R. Diehl, Dr. J. Elbs, Dipl.-Ing. J. Eder, Dr. A. Finoguenov, Dr. S. Foley, W. Frankenhuisen, Dr. M. Freyberg, Dr. P. Friedrich, Dr. J. Greiner, F. Guglielmetti, Dr. F. Haberl, Dipl.-Math. G. Hartner, Dr. G. Kanbach, Dr. A. von Kienlin, Dr. N. Kimmel, J.W. Kim, Dr. S. Komossa, Dr. G. Lemson, Dr. P. Martin, Dr. N. Meidinger, Dr. A. Merloni, A. Meuris, Dr. M. Mühlegger, Dr. M. Nardini, Dipl.-Phys. E. Pfeffermann, Dr. W. Pietsch, Dr. P. Predehl, Dr. A. Rau, D. Rehm, Dr. M. Rovilos, Dr. S. Savaglio, Dr. P. Schady, Dr. F. Schopper, Dr. A. Strong, Prof. Dr. L. Strüder, Dr. J. Treis, Dr. W. Voges, M. Vongehr, Dr. R. Voss, Dr. A. Winter, A. Yoldas, Dr. X.-L. Zhang, Z. Zhang.

*Doktoranden/Diplomanden:*

P. Afonso, A. Bähr, M.G. Bernhardt, E. Bissaldi, D. Burlon, R. Capelli, P. Chaudhary, S. Ebermayer, J. Elliot, V. Fedl, R. Filgas, M. Fürmetz, D. Gruber, M. Henze, H.-H. Huang, C. Jocham, K. Kretschmer, T. Kruehler, M. Lang, T. Lauf, H. Ohlendorf, F. Olivares, T. Prinz, J. Repp, G. Schächner, A. Stefanescu, H. Stiele, R. Sturm.

*C. Theorie und Komplexe Plasmen*

Dr. T. Antonova, Dr. T. Aschenbrenner, Dr. P. Badyopadhyay, Dr. H. Böhringer, Dr. P. Brandt, Dr. W. Bunk, Dr. M. Chaudhuri, Dr. L. Couédel, Dr. R. Fassbender, K. Hartmann, Dipl.-Phys. H. Höfner, Dr. L. Hou, Dr. A. Ivlev, Dr. S. Khrapak, Dr. B. Klumov, Dr. C. Knapek, Dr. U. Konopka, Dr. M. Kretschmer, A. Langer, Dr. Y. Li, Dr. S. Mitic, Dr. R. Monetti, Dr. T. Nosenko, Dr. V. Nosenko, Dr. D. Pierini, Dr. R. Pompl, Dr. M. Pustynnik, Dr. Ch. Räh, Dr. M. Rubin-Zuzic, Dr. H. Scheingraber, Dr. M. Schwabe, Dr. S. Shimizu, Dr. T. Shimizu, Dr. I. Sidorenko, Dr. R. Sütterlin, Dr. M. Thoma, Dr. H. Thomas, Dr. V. Yaroshenko, Dr. S. Zhdanov, Dr. J. Zimmermann.

*Doktoranden/Diplomanden:*

C. Du, M. Fink, S. Giodini, R. Heidemann, P. Huber, J. Jeon, K. Jiang, T. Klämpfl, J. Köritz, V. Lachner, J. List, H. Meyer, S. Mihatsch, G. Rossmanith, R. Suhada, A. Weissmann, L. Wörner, F. Ziparo.

*D. Optische und Interpretative Astronomie*

Prof. Dr. A. Burkert, Dr. L. Coccato, Dr. C. Dalla Vecchia, Dr. F. De Lorenzi, Dr. C. Dobbs, Dr. N. Drory, Dr. F. Durier, Dr. P. Erwin, Dr. V. Gaibler, Prof. Dr. O. Gerhard, Dr. C. Grillo, Dr. F. Grupp, Dr. U. Hopp, Dr. S.M. Hu, C. Ingram, Dr. J. Johnson, Dr. R. Katterloher, Dr. S. Khochfar, Dr. M. Krause, Dr. M. Landriau, Dr. U. Maio, Dr. I. Martinez-Valpuesta, Dr. M. Montalto, Dr. B. Muschiello, Dr. E. Neistein, Dr. N. Nowak, Dr. E. Noyola y Loya, Dr. S. Phleps, Dr. H. Relke, M. Rieperding, Dr. R. Saglia, Dr. K. Saha, Dr. A. Sanchez, Dr. M. Schartmann, Dr. M. Schweitzer, Dr. R. Senger, Dr. P. Steele, Prof. Dr. J. Weller, Dr. D. Wilman, Dr. X. Wu, Dr. H. Ziaee pour.

## Doktoranden/Diplomanden:

A. Bharska, A. Brucalassi, M. Cappetta, J. Connelly, P. Das, M. Fabricius, M. Hilz, M. Hirschmann, F. Klein, H. Kotarba, K. Markovic, I. Misgeld, F. Montesano, L. Morganti, E. Ntormousi, M. Opitsch, L.G. Oser, S. Pekruhl, S. Prianto Rusli, S. Pu, H. Schlagenhauser, R. Schoenrich, J. Sundquist, G. Ventimiglia, P. Wulstein, J. Zendejas Dominguez.

*E. Ingenieurbereiche und Werkstätten*

## a) Elektrotechnik

Dipl.-Ing. S. Albrecht, Dipl.-Ing. (FH) L. Barl, Dipl.-Ing. (FH) W. Bornemann, Dipl.-Ing. (FH) T. Burghardt, H. Cibooglu, M. Deuter, A. Emslander, Dr. F. Fumi, M. Geithner, R. Gressmann, Dipl.-Ing. (FH) T. Hagl, Dipl.-Ing. (FH) O. Hälker, O. Hans, M. Hengmith, Dipl.-Ing. (FH) S.-C. Herrmann, Dipl.-Ing. (FH) F. Huber, Dipl.-Ing. S. Kellner, Dipl.-Ing. (FH) W. Kink, P. Langer, R. Lederer, D. Mießner, Dipl.-Ing. (FH) S. Müller, F. Oberauer, A. Peci, Dipl.-Ing. G. Plasoianu, Dipl.-Ing. (FH) C. Rau, J. Reiffers, P. Reiss, T. Rupprecht, M. Schneider, F. Schrey, Dipl.-Ing. K. Tarantik, K. Tomic, Dipl.-Ing. G. Wildgruber, V. Yaroshenko, J. Zanker-Smith, Z. Zhang, Dipl.-Ing. (FH) J. Ziegleder.

## b) Mechanik

R. Bayer, T. Blasi, M. Bibracher, J. Brandstetter, A. Brara, B. Budau, S. Czempiel, C. Deysenroth, M. Deysenroth, Dipl.-Ing. (FH) K. Dittrich, J. Eibl, P. Feldmeier, J. Gahl, A. Goldbrunner, J. Hartwig, Dipl.-Ing. (FH) M. Haug, M. Honsberg, F.-X. Huber, Dipl.-Ing. H. Huber, S. Huber, H.J. Kestler, J. Liebhardt, R. Mayr, R. Mayr-Ihbe, Dipl.-Ing. (FH) B. Mican, Dipl.-Ing. (FH) D. Pietschner, M. Plangger, C. Rohe, R. Sandmair, A. Schneider, P. Schnell, C. Schreib, W. Schunn, F. Soller, G. Stadler, P. Straube, R. Strecker, T. Urban, Dipl.-Ing. M. Thiel, Dipl.-Ing. L. Tiedemann, S. Wick.

## c) Auszubildende

D. Cziasto, M. Greil, M. Hiefinger, D. Huber, T. Kratschmann, F. Mihé, S. Senftleben, M. Wachendorf.

*G. Zentrale DV-Gruppe*

H. Baumgartner, Dipl.-Phys. A. Bohnet, B. Bribian-Sanchez, 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. Wieszorrek.

*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*

G. Apold, A. Arturo, M. Bauernfeind, U. Bitzer, M. Blaschek, U. Cziasto, E. Doll, C. Eicher, M. Ertl, S. Goldbrunner, M. Grasmann, M. Grohmann, H.-P. Gschnell, M. Ihle, I. Inhofer, T. Jäkel, J. Jirsch, W. Karing, M. Keil, L. Kestler, V. Kliem, T. Kürzinger, E. Kuhwald, L. Mayer, A. Mühlberg, A. Nagy, A. Neun, M. Peischl, C. Preisler, A. Reither, R. Rochner, E. Rossa, P. Sandtner, E. Sarsilmaz, B. Scheiner, S. Schwaiger, B. Schrötter, S. Schwaiger, Dipl.-Ökonom G. Seeger, R. Steinle, R. Strecker, L. Thiess, J. Vogt.

**2 Preise, Auszeichnungen, Berufungen**

Diehl, Roland: Ernennung zum Professor (apl), TU München, Germany, August 2010

Genzel, Reinhard: Cecelia Payne-Gaposchkin Lecture, Harvard Smithsonian Center for Astrophysics, Cambridge, USA, May 2010

Genzel, Reinhard: Jansky Lecturer, National Radio Astronomy Observatory, Charlottesville, USA, November 2010

Tacconi, Linda: Sackler Lecturer 2010, Leiden University, Niederlande, Oktober 2010

**3 Lehrtätigkeiten**

Becker, W.: Weiße Zwerge, Neutronensterne und Schwarze Löcher, LMU München WS 09/10 und 10/11; Gravitationswellen und ihr Nachweis, LMU München SS 10; Endstadien der Sternentwicklung, LMU München WS 09/10 und WS 10/11; Astrophysikalisches Doktorandenseminar mit den Studenten der *International Max-Planck Research School on Astrophysics*, LMU München WS 09/10, SS 10 und WS 10/11

Bender, R.: Astronomisches Hauptseminar zur Astrophysik, LMU München WS 09/10; Astrophysikalisches Praktikum "A" und Übungen, LMU München WS 09/10; Astrophysikalisches Praktikum "B" und Übungen, LMU München WS 09/10; Astronomisches Kolloquium, LMU München WS 09/10, SS 10 und WS 10/11; Extragalactic Journal Club, LMU München WS 09/10; Extragalactic Group Seminar, LMU München WS 09/10 und WS 09/10; Einführung in die fortgeschrittene Astrophysik II, LMU München SS 10; Ergänzung zur Vorlesung P4.1 "Einführung in die fortgeschrittene Astrophysik II", LMU München SS 10; Astrophysikalisches Hauptseminar II theoretisch und numerisch orientiert, "Tools in modern astrophysics", LMU München SS 10 und WS 10/11; "Project Seminar: Galaxies", Projektseminar aus dem Bereich der Kosmologie, der großräumigen Strukturen, der Struktur von Galaxien und der Dunklen Materie sowie der Dunklen Energie, der Schwarzen Löcher und der Gravitationslinsen, LMU München SS 10; Grundlagen der fortgeschrittenen Astrophysik, LMU München SS 10 (mit Saglia); Ergänzung zur Vorlesung P1.1 "Grundlagen der fortgeschrittenen Astrophysik", LMU München WS 10/11

Böhringer, H.: Introduction to Cosmology and the Study of Large-Scale Structure, IMPRS Garching WS 10/11

Böhringer, H. / Fassbender, R. / Phleps, S.: Einführung in die beobachtungsorientierte Kosmologie I, LMU München WS 09/10; Einführung in die beobachtungsorientierte Kosmologie II, LMU München SS 10

Boller, Th.: Kernregionen aktiver Galaxien, J.-W. von Goethe Univ. Frankfurt WS 09/10; Verteilungsfunktionen in der Astrophysik: CDM Kosmologie, Aktive Galaktische Kerne, J.-W. von Goethe Univ. Frankfurt WS 09/10; Strahlung und Materie, Das Planetensystem, Physik der Sonne, J.-W. von Goethe Univ. Frankfurt SS 10;

Diehl, R.: Seminar on "Nuclei in the Cosmos", TU München WS 09/10; SS 10 und WS 10/11 (mit Professoren der TUM, LMU und MPA); High-Energy Astrophysics, IMPRS Garching SS 10; Observational High-Energy Astrophysics, TU München SS 09

Eisenhauer, F.: Einführung in die Astrophysik, TU München WS 09/10, WS 10/11

Genzel, R.: Galaxy evolution from the galaxies perspective: from gas to stars and back again, University of California, Berkeley, USA SS 10 (mit L. Tacconi); Advanced Course 1: Experimental Astrophysics: Optical to Radio Wavelength Range, IMPRS Garching WS 1011

Gerhard, O.: IMPRS Advanced Course II Galaxies and the Galaxy: Structure and Dynamics in the Milky Way, IMPRS Garching WS 09/10

Gillessen, S.: Seminar "Tools in Modern Astrophysics", LMU München WS 09/10

Khochfar, S.: Structure Formation in the Universe, Uni. Heidelberg WS 09/10

Saglia, R.: Grundlagen der fortgeschrittenen Astrophysik, LMU München SS 10 (mit R. Bender);

Tacconi, L.: Galaxy evolution from the galaxies perspective: from gas to stars and back again, University of California, Berkeley, USA SS 10 (mit R. Genzel)

Thoma, M.: Physik in der Schwerelosigkeit, Univ. Gießen WS 09/10; Komplexe Plasmen, Univ. Gießen SS 10; Theoretische Plasmaphysik, Univ. Gießen WS 10/11

Thoma, M. (mit Kretschmer, M. und Schwabe, M.): Fortgeschrittenenpraktikum III und IV - Versuch 03: Plasmakristall, TU München WS 09/10, SS 10, WS 10/11

## 4 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) Theorie und komplexe Plasmen. Diese Arbeitsbereiche beschäftigen sich – oft bereichsübergreifend – mit unseren fünf großen Forschungsthemen (siehe "Allgemeines"). Unsere Wissenschaft ist ausführlich auf unseren Internetseiten (<http://www.mpe.mpg.de>) unter dem Punkt "Forschungsbereiche" dargestellt. Wichtige Einzelergebnisse sind unter "Aktuelles Thema" und "MPE Meilensteine" in zeitlicher Reihenfolge beschrieben.

## 5 Akademische Abschlussarbeiten

### 5.1 Diplomarbeiten

Klein, F.: Supermassereiche schwarze Löcher in elliptischen Riesengalaxien. LMU München 2010.

Obermeier, C.: Habitable extrasolare Planete um Zwergsterne (Bachelorarbeit). LMU München 2010.

Prinz, T.: Zeitanalyse der Röntgenemission von Pulsaren und deren spezielle Anwendung für die Navigation von Raumfahrzeugen. LMU München 2010.

### 5.2 Dissertationen

Brandt, P.C.: Phasenübergänge in komplexen Systemen mit anisotropischen Potenzialen. LMU München 2010.

Dodds-Eden, K.: The Bright Side of the Black Hole: Flares from Sgr A\*. LMU München 2010.

Engel, H.: Major Mergers Between Galaxies - Their Role in the High-Redshift Universes and Two Nearby Cases Studies. LMU München 2010.

Knapek, C.A.: Phase Transitions in Two-Dimensional Complex Plasmas. LMU München 2010.

Mitic, S.D.: Physical Processes in Complex Plasma. LMU München 2010.

Mühlegger, M.L.: Simulated Observations of Galaxy Clusters for Current and Future X-ray Surveys. TU München 2010.

Sütterlin, R.: Physics of Complex Plasmas: Some fundamental problems. LMU München 2010.

Stiele, H.: X-ray Source Population Study of the Local Group Galaxy M 31. LMU München 2010

## 6 Tagungen und Veranstaltungen

**460th Wilhem and Else Heraeus Seminar on Black Holes**, Bad Honnef, Germany, 7.-11.6.2010, Organisation: S. Komossa, B. Schutz, K. Danzmann.

**Ultraluminous X-ray Sources and Middle-Weight Black Holes**, ESAC, Madrid, Spain, 24.-26.5.2010, Organisation: R. Mushotzky, D. Barret, A. Barth, H. Baumgardt, S. Komossa, H. Falcke, L. Ho, E. Koeding, M. Mendez, C. Motch, et al.

**HEAD 2010 - Special Session on High-Energy Signatures of Massive Black Hole Mergers**, Kona, USA, 1.-4.3.2010, Organisation: J. Centrella, S. Komossa.

**Accretion and Outflow in Black Hole Systems**, Kathmandu, Nepal, 10.-15.10.2010, Organisation: B. Aryal, M. Cappi, S. Colafrancesco, E. Gallo, J. Greiner, A. Janiuk, S. Komossa, J. Malzac, R. Misra, E. Palazzi, J. Poutanen, F. Yuan, A. Żdziarski, J. Ziolkowski.

**The 5th Zermatt ISM Symposium.  $\frac{1}{2}$  Conditions and Impact of Star Formation: New Results with Herschel and Beyond**, Zermatt, Switzerland, 19.-24.9.2010, Organisation: M. Burton, J. Cernicharo, M. Harwit, D. Hollenbach, M. Meyer, A. Omont, M. Rubio, S. Schlemmer, J. Stutzki, L.J. Tacconi, X. Tielens, G. White, S. Yamamoto.

**Extreme Starbursts in the Local Universe**, Granada, Spain, 21.-25.6.2010, Organisation: A. Alonso-Herrero, G. Canalizo, P. Di Mateo, R. González Delgado, T. Heckman, P. Hopkins, J. Rodríguez-González-Zauri, L.J. Tacconi, C. Tadhunter, J. Turner, S. Veilleux.

**Massive Galaxies Over Cosmic Time 3: The Role of Gas and Dust**, Tucson, Arizona, USA, 8.-10.11.2010, Organisation: R. Dave, V. Desai (co-Chair), A. Dey, D. Elbaz, D. Frayer, J. Melbourne, A. Pope (co-Chair), L.J. Tacconi.

**Galaxies in the Distant Universe Workshop**, Ringberg Castle, 17.-21.5.2010, Organisation: R. Bower, A. Cimatti, F. Combes, R. Davies, A. Dekel, B. Elmegreen, N.M. Förster Schreiber (co-chair), R. Genzel, G. Kauffmann, S. Lilly, D. Lutz, A. Shapley, L.J. Tacconi (co-chair).

**Rocky Planets around cool stars Meeting**, MPE Garching, 10.-11.5.2010, Organisation: R.P. Saglia.

**ESF Exploratory Workshop: “Cosmogony of active galactic nuclei: unifying approaches for the next decade”**, Brindisi, Italy, 1.-3.9.2010, Organisation: A. Merloni, F. Panessa, R. Goosmann.

**What drives the Growth of Black Holes**, Durham, 26.- 29.7.2010, Organisation: D. Alexander, R. Hickox, P. Best, R. Davies, T. di Matteo, A. Fabian, J. Greene, M. Volonteri.

**WittFest: Origins & Evolution of Dust**, Toledo, OH, USA, 10.-12.10.2010, Organisation: K.D. Gordon, G. Clayton, B. Draine, D. Furton, D. Pierini, J.D. Smith, T. Smith, U. Vijh and D. York.

**Tracing the Ancestry of Galaxies (on the land of our ancestors), IAU Symposium No. 277**, Ouagadougou, Burkina Faso, 13.-17.12.2010, Organisation: C. Carignan, K.C. Freeman, L. Blitz, D.L. Block, W.J.G. de Blok, M. Bureau, F. Combes, S. Courteau, K. Fathi, N.M. Förster Schreiber, R. Guzman, C. Mendes de Oliveira, J. Navarro, M. Pettini, Y. Sofue, and M. Steinmetz.

**Galaxies in the Distant Universe: Dynamics, Gas, and Early Evolution**, Ringberg Castle, Ringberg, Germany, 17.-21.5.2010, Organisation: N.M. Förster Schreiber, L.J. Tacconi, R. Bower, A. Cimatti, F. Combes, R. Davies, A. Dekel, B.G. Elmegreen, R. Genzel, G. Kauffmann, S.J. Lilly, D. Lutz, and A.E. Shapley.

**Team meeting for DAO of Tau HST program**, Boulder, Colorado, USA, 28.-30.6.2010, Organisation: G.J. Herczeg.

**ESLAB 2010 - Herschel First Results Symposium**, Noordwijk, Netherlands, 4.-7.5.2010, Organisation: P. Barthel, J. Cernicharo, P. Encrenaz, J. Fischer, M. Griffin, P. Harvey, M. Harwit, F. Helmich, T. Phillips, G. Pilbratt, A. Poglitsch, J. Riedinger, L. Vigroux and C. Waelkens.

**Directional discontinuities in the interplanetary magnetic field**, International Space Science Institute, Bern, Switzerland, 1.-7.7.2010. Organisation: G. Paschmann.

**Solar Energetic Particles: Session C of the Joint ACE / SOHO / STEREO / WIND In-Situ Science Symposium**, Kennebunkport, USA, 8.-10.6.2010. Organisation: B. Klecker, D. Mewaldt.

**Plasma Medicine Workshop**, Ringberg Castle, 12.-15.10.2010. Organisation: K. Hartmann, J. Zimmermann.

## 7 Projekte am Institut

### 7.1 Kooperationen mit anderen Instituten

#### Argentinien

Observatorio Astronomico Felix Aguilar (OFAA), Universität San Juan, and Instituto de Astronomia y Fisica del Espacio (IAFE), CONICET, Buenos Aires: H-alpha Solar Telescope for Argentina (HASTA).

#### Australien

Australian National University: Galaxienentstehung.

Melbourne University: Astro-Plasmaphysik.

Monash University: 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: DES.

Centro Brasileiro de Pesquisas: DES.

Universidade Federal do Rio: DES.

Universidade de Sao Paulo: Galaxienentstehung.

#### Chile

Universidad de Concepcion: Röntgen-Doppelsternsysteme.

Universidad Catolica Santiago: Röntgen-Doppelsternsysteme.

#### China

Institute for High-Energy Physics (IHEP), Peking: AGN und unidentifizierte Gammaquel-



len von COMPTEL und INTEGRAL.

Institute for Plasma Physics, Hefei: Komplexe Plasmen, Staubbildung in Fusionsreaktoren.

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

#### Deutschland

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

Christian-Albrechts-Universität, Kiel: Komplexe Plasmen.

Dept. Earth and Environmental Sciences of LMU Munich: Raman Spectroscopy.

Dept. of Neuropathology, TU Munich: Raman Spectroscopy; Plasma Medicine.

DLR-Köln Porz: Plasmakristall Experiment; PKE-Nefedov.

European Southern Observatory (ESO), Garching: KMOS Multiobjekt-Spektrograph für VLT; GRAVITY; Galaxienentstehung; ASTRO-WISE; OmegaCAM; MICADO, Nukleare Astrophysik.

Fraunhofer Institut für Festkörpertechnologie, München: IXO; eROSITA.

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

IAP Berlin: HETDEX.

Institute of Experimental Oncology, TU Munich: Plasma Medicine.

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

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

Klinik für Dermatologie, Allergologie und Umweltmedizin, Krankenhaus München Schwabing: Plasmamedizin.

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

Laser Zentrum Hannover: Development of advanced Filters for MICADO.

Leibniz Rechenzentrum der Bayerischen Akademie der Wissenschaften, Garching: Label free imaging and Pattern Recognition.

Ludwig-Maximilians-Universität, München: OmegaCAM; ASTRO-WISE; KMOS; MICADO; HETDEX.

Maier-Leibnitz Laboratorium, Garching: eROSITA.

Max-Planck-Institut für Astronomie, Heidelberg: GRAVITY; LUCIFER; Herschel-PACS; PanSTARRS; SDSS; ARGOS; MICADO; EUCLID.

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

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

Max-Planck-Institut für Kernphysik: CFEL.

Max-Planck-Institut für Biomedizinische Forschung: CFEL.

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

Max-Planck-Institut für Biophysische Chemie: CFEL.

Max-Planck-Institut für Radioastronomie, Bonn: ARGOS.

Physikalisch-Technische Bundesanstalt Berlin: eROSITA; TES Bolometer SQUID-Ausleseschaltung.  
Städtisches Klinikum München GmbH, Mikrobiologie Zentrallager Schwabing; Plasmamedizin.

Thüringer Landessternwarte Tautenberg: GROND; Gamma-Ray Bursts.

Technische Universität Berlin: Interstellares Medium.

Technische Universität Darmstadt: CAST.

Technische Universität München: Plasmamedizin; Nukleare Astrophysik.

Universität Bochum: Komplexe Plasmen; LUCIFER.

Universität Bonn: Test von Pixeldetektoren für IXO; OmegaCAM; ASTRO-WISE; eROSITA.

Universität Düsseldorf: Komplexe Plasmen.

Universität Erlangen: eROSITA.

Universität Greifswald: Komplexe Plasmen.

Universität Hamburg: eROSITA; OPTIMA.

Universität Heidelberg: IXO; XFEL.

Universität Jena: Isolierte Neutronensterne; Nukleare Astrophysik.

Universität Kiel: Komplexe Plasmen.

Universität Köln: Galaktisches Zentrum; GRAVITY.

Universität Mannheim: IXO; XFEL.

Universität Regensburg, Department für Dermatology, Uni.-Klinik Regensburg: Plasmamedizin.

Universitätssternwarte Göttingen: OmegaCAM.

Universität Siegen: Compton Kamera.

Universität Würzburg: AGADE.

#### *Frankreich*

CEA, Saclay: INTEGRAL-Spektrometer SPI; Herschel-PACS; CAST; EUCLID: SPICA.

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

GREMI-Lab, Orleans: Komplexe Plasmen; Plasmakristall Experiment auf der ISS.

IAP Paris: Nukleare Astrophysik.

IGRP Marseille: Herschel-PACS.

LAM: EUCLID.

LAOG Grenoble: GRAVITY.

OAMP Marseille: Herschel-PACS.

Observatoire de Meudon: ASTRO-WISE.

Observatoire de Paris / LESIA: 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

Belfast Queen's University: PanSTARRS.

BRUNEL University: IXO.

John Moores University, Liverpool: Himmelsdurchmusterung Galaxienhaufen.

Loughborough University, Department of Electronic and Electrical Engineering: Plasma Medicine.

Open University, Milton Keynes: Kataklysmische variable; Novae.

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

University of Birmingham: INTEGRAL-Spektrometer SPI; XMM-Newton.

University of Cambridge: DES; RoPacs.

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

University of Durham: KMOS; PanSTARRS.

University of Edinburgh: DES; KMOS; PanSTARRS.

University of Hertfordshire: RoPACS.

University of Leeds: Komplexe Plasmen.

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

University of Liverpool: Komplexe Plasmen.

University of Nottingham: DES.

University of Portsmouth: DES.

University of Sussex: DES.

University of Southampton: Magellanic Clouds.

University of Wales, Cardiff: Filter für Herschel-PACS und SOFIA.

University Oxford: Komplexe Plasmen; KMOS.

United Kingdom Astronomy Technology Centre (UKATC): EUCLID.

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: Komplexe Plasmen; Galaktisches Zentrum.

Italien

Brera Astronomical Observatory: Himmelsdurchmusterung Galaxienhaufen; IXO.

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

INAF: Arcetri: ARGOS.

INAF Padua: Herschel-PACS; OmegaCam; MICADO.

INAF Roma: Nukleare Astrophysik.

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

INFR Frascati: SIDDHARTA.

Istituto di Fisica Cosmica e Tecnologia, Mailand: INTEGRAL-Spektrometer SPI.

Istituto di Fisica dello Spazio Interplanetario (CNR), Frascati: Herschel-PACS.

OAA/LENS Firenze: Herschel-PACS.

Osservatorio di Capodimonte, Napoli: OmegaCAM; ASTRO-WISE.

Politecnico di Milano: rauscharme Elektronik; Röntgendetektorenentwicklung.

University Bologna: EUCLID.

Universität Neapel: Komplexe Plasmen.

#### Japan

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

JAXA: PK-3 Plus; PK-4; Plasmalab.

Kyoto Institute for Technology: Komplexe Plasmen, PK-3 Plus; Plasmalab.

Tohoku University: Komplexe Plasmen.

University of Osaka: Astro H; IXO CCDs.

Yokohama National University: Komplexe Plasmen.

#### Kroatien

Ministry of Science and Technology, Zagreb: CAST.

#### Niederlande

ESTEC, Noordwijk: XMM-Newton-TS-Spiegelkalibration; CCD Entwicklung; Radiation Performance Instrument; INTEGRAL; EUCLID; PK-4.

FOM Institute for Plasma Physics, Rijhuizen: Komplexe Plasmen.

NOVA Leiden: MICADO.

SRON, Utrecht: Chandra-LETG; TES für SPICA/IXO.

Sterrewacht Leiden: ASTRO-WISE; OmegaCAM.

University Eindhoven: Komplexe Plasmen; PlasmaLab.

University of Groningen, Kapteyn Institute: Rekonstruktion der Dichteverteilung im Universum; OmegaCAM; ASTRO-WISE.

#### Norwegen

Universität Trømsø: Komplexe Plasmen.

#### Österreich

Universität und TU Wien: Herschel-PACS.

#### Polen

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

University Zielona Gora: OPTIMA.

#### Portugal

Sim Lissabon: GRAVITY.

Universität Lissabon: Komplexe Plasmen.

#### Russland

Joint Institute for High Temperatures (JFHT) of the Russian Academy of Science, Moscow: Plasmakristall Experiment (PKE); PKE-Nefedov; PK-3 Plus; PK-4; Plasmalab; Plasma-medizin.

Institute Physics of Earth, Moscow: Plasmaphysik.

Institute for Biomedical Problems of the Russian Academy of Sciences, Moscow: Plasma Medicine.

Institute for Epidemiology and Microbiology Problems of the Russian Academy of Medical Sciences, Moscow: Plasma Medicine.

Institute for Theoretical and Experimental Biophysics of the Russian Academy of Sciences, Moscow: Plasma Medicine.

Institute for Problems of Chemical Physics of the Russian Academy of Sciences, Moscow: Plasma Medicine.

Institute for Physical Chemical Medicine of the Russian Academy of Medical Sciences, Moscow: Plasma Medicine.

Space Research Institute (IKI) of the Russian Academy of Science, Moscow: eROSITA.

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

#### Schweden

University Lund/Observatory: OPTIMA.

University Stockholm: Komplexe Plasmen; Staubdetektion in Fusionsreaktoren.

#### Schweiz

CERN, Geneva: CAST.

International Space Science Institute, Bern: Plasmaphysik.

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

Universität Basel: Nukleare Astrophysik.

#### Spanien

Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas: DES.

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

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

Instituto de Ciencias del Espacio: DES.

Institut de Fisica d'Altes Energies: DES.

LAEFF, Madrid: RoPACS.

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.

#### Ukraine

Main National Observatory, Kiev: RoPACS.

USA

Argonne National Laboratory: DES.

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

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

CfA, Cambridge: IXO WFI.

Clemson University: Gamma-Ray Bursts; Nukleare Astrophysik.

Fermilab, Batavia: DES.

Harvard University: PanSTARRS.

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

Jet Propulsion Laboratory, Pasadena: EUCLID.

Johns Hopkins University: PanSTARRS.

Lawrence Berkeley National Laboratory, Berkeley: Herstellung der Ge:Ga Detektorelemente für Herschel-PACS und SOFIA; Charakterisierung von GaAs-Detektorenmaterial.

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

MIT, Cambridge: IXO WFI.

NOAO, Tucson: DES.

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

Naval Research Laboratory: Komplexe Plasmen.

Naval Postgraduate School, Monterey: Modellierung der Halbleitereigenschaften von Galliumarsenidmaterial für Infrarotdetektoren.

Ohio State University, Columbus: DES.

Old Dominion University Norfolk, Laser & Plasma engineering Institute: Plasma Medicine.

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

Pennsylvania State University: HETDEX; IXO WFI; Swift.

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

Space Telescope Science Institute, Baltimore: Galaxienentstehung.

STC: EUCLID.

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

SLAC: CAMP, DES.

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; Fern-Infrarot-Detektoren.

University of California, San Diego: Komplexe Plasmen.

University of California, Santa Cruz: DES.

University of Chicago: DES.

University of Colorado, Boulder: SAMPEX; Komplexe Plasmen.

University of Iowa, Iowa City: Komplexe Plasmen; IMPF; PKE-Nefedov; PK-3 Plus.

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

University of Maryland, College Park, MD: SOHO; ACE.

University of Pittsburgh: Galaxienentstehung.

University of Texas, Austin: Galaxienentstehung; HETDEX.

University of Toledo: Galaxienentstehung.

University of Washington, Seattle: CLUSTER/CIS.

University Space Research Association, Moffett Field: SOFIA.

## 7.2 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.

ASTRO-WISE: LMU München, Universität Bonn, Germany; Sterrewacht Leiden, University of Groningen, The Netherlands; Osservatorio di Capodimonte, Napoli, Italy; Observatoire de Meudon, Paris, France.

BOSS – Baryon Oscillation Spectroscopic Survey: SDSS-III 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, 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.

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.

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: Observatoire de Paris /LESIA, France; MPIA Heidelberg, Universität zu Köln, Germany; European Southern Observatory, Garching, Germany.

GROND – Gamma-Ray Burst Optical Near-IR Detector: Landessternwarte Tautenburg, Germany; ESO Garching, Germany.

Herschel – PACS (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.

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; Institute de Physique Nucleaire Université de Louvain, Belgium; Istituto di Fisica Cosmica e Tecnologia del CNR Milano, Italy; University de Valencia Burjassot, Spain; University of Birmingham, UK; NASA/GSFC Greenbelt, University of California Berkeley.

IXO – International X-ray Observatory: University of Leicester, UK; SRON Utrecht, The



Netherlands; Institut für Astronomie und Astrophysik Tübingen, Germany; CESR Toulouse, France; Institute of Space and Astronautical Science (ISAS), Japan.

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

LBT – Large Binocular Telescope Project: MPIA Heidelberg, MPIfR Bonn, Landessternwarte Heidelberg Königstuhl, Astrophysikalisches Institut Potsdam, Germany; University of Arizona Tucson, 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.

MICADO – MCAO Imaging Camera for Deep Observations: LMU, USM, MPIA, Germany; INAF Padova, Italy; NOVA, Federation of Dutch University Astronomy Departments, The Netherlands; GIS-Phase Paris, France.

OmegaCAM – Wide Field Imager of the VST: ESO Garching, LMU München, Universität Bonn, Universitätssternwarte Göttingen, Germany; Sterrewacht Leiden, University of Groningen, The Netherlands; Osservatorio di Capodimonte, Napoli, OAP Padua, Italy.

PanSTARRS: MPIA Heidelberg, Germany, University of Hawaii, Harvard University, USA, Johns Hopkins Univ. Baltimore, MD, USA, Universities of Durham, Edinburgh, Belfast, UK.

PK-3 Plus (Plasma-crystal experiment): JIHT Moscow, Russia; University of Iowa City, USA; DLR-Köln, Germany; Université d'Orléans CNRS, France.

PK-4 (Plasma-crystal experiment): JIHT Moscow, Russia; Université d'Orléans CNRS, France; University Stockholm, Schweden, University Napoli, Italy; University Tromsø, Norway; University Liverpool, UK; University Iowa, University Auburn, USA; ESTEC Noordwijk, The Netherlands; DLR Bonn, Germany.

PlasmaLab: JIHT Moscow, Russia; GREMI-Orleans, France; Tohoku University Sendai, Japan.

RoPACS – Marie Curie Initial Training Network to study Rocky Planets around Cool Stars: University of Hertfordshire, Institute of Astronomy, Cambridge, UK; Instituto de Astrofísica de Canarias, Laboratono de Astrofísica Espacuval y Física Fundamental, Madrid, Spain; Main Astronomical Observatory, Kiev, Ukraine.

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: University of Tokyo, ISA/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.

Topical Team – Critical Point in Complex Plasmas: ESA, Paris, France; JAXA, Tokyo, Japan; JIHT, Moscow, Russia.

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

XMM-Newton/TS: ESTEC Noordwijk, The Netherlands.

XMM-Newton/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.

### 7.3 Projekte mit der Industrie

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

ABN GmbH, Neuried: Betreuung der Testanlage PANTER.

ADTEC Plasma Technology Co. Ltd., Hiroshima: Entwicklung eines Niedertemperatur-Plasma-Gerätes zur in-vivo Sterilisation für Medizinanwendungen.

Albedo GmbH, München: Soft- and Hardware Entwicklung für PK-3 Plus; Elektronik für SDD-Auslese.

Array Electronics, Engmanting: DAQ development OPTIMA.

ASTEQ GmbH, Kelkheim: Fertigung von Detektorarrays aus gedrücktem Ge:Ga und Bearbeitung von Detektorproben aus Galliumarsenid; SAFARI.

Bach Research corp, Boulder, USA: Gratings for Lucifer.

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

Berner & Mattner Systemtechnik GmbH, München: PK-4 documents, construction of plasma diagnostics system.

Bonerz engineering, Weiler-Simmerberg: Platinenentwicklung, Elektronikentwicklung.

Buchberger GmbH, Tuchenbach: Fertigung Strukturteile für PANTER-Manipulatoren und OPTIMA; Strukturteile CAST und GROND; Lucifer.

Carl Zeiss, Jena: eROSITA Spiegel und Mandrels.

Cryovac, Troisdorf: Cryogenic Design for GRAVITY.

Drollinger, Birkenfeld: Vergoldung von Detektorteilen für FIFI-LS.

EADS Atrium Munich: Euclid design study.

ESS, Landsberg: Wartung der Elektroinstallation; Ergänzung der Ansteuerungseinheit für das Vakuumpumpensystem; Fertigung von elektrischen Ansteuerungen für die Testanlagen PANTER, CALIFA und PUMA.

ESL GmbH, Berlin: Fertigung von Leiterplatten.

Euro Hect Pipes, Nivelles, Belgien: Cooling System for eROSITA.

Freyer GmbH, Tübingen: PANTER.

Guido Lex Werkzeugbau GmbH, Miesbach: Strukturteile für FIFI-LS.

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

IMEC, Leuven, Belgium: Herstellung von kryogenen Ausleseelektronik-Schaltkreisen in neuer CMOS Technologie für IR-Detektoren auf Herschel-PACS; FIFI-LS; SAFARI.

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

Ingenieurbüro pfma, Haar-Salmdorf: SAFARI.

Ingenieurbüro Weisz, München: Design und Konstruktion für LUCIFER; PACS Testoptik; SAFARI.

Invent GmbH, Braunschweig: CFRP-Telescopestructure for eROSITA.

Kaiser Optical Systems Inc., Ann Arbor, USA: VIRUS-W VPH grating.

Kayser-Threde GmbH, München: Hauptkontraktor für Herschel-PACS; Halbleiter-Detektoren Gamma-Astronomie; Plasmakristall-Experiment auf der Internationalen Raumstation; PKE; PK-3 Plus; PK-4; eROSITA-Spiegelsystem.

Kugler GmbH, Salem: Spiegel für OPTIMA, FIFI-LS.

Laserjob GmbH, Grafrath: Entwicklung Röntgenbaffle für eROSITA.

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

Menlo Systems, Martinsried: Metrology Laser for GRAVITY.

Newport, Darmstadt: Cryogenic rotation stages for GRAVITY.

PFMA Munich: Mechanical Design for GRAVITY.

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

Physik Instrumente Karlsruhe: Cryogenic Piezo Actuators for GRAVITY.

Scientific Instruments, Tucson, USA: Construction of the 16x16K CCD Mosaic Detector of the Wendelstein Wide Field Camera.

Siegert Electronics GmbH, Cadolzburg: Ausleseelektronik-Platinen für FIFI-LS; SAFARI.

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

von Hoerner & Sulger, Schwetzingen: Manufacturing for PK-4.

## 8 Veröffentlichungen

### 8.1 In Zeitschriften und Büchern

Abbas, U., S. de la Torre, O. Le Fèvre, ..., A. Bongiorno, et al.: The VIMOS-VLT Deep Survey: evolution in the halo occupation number since  $z \sim 1$ . *Mon. Not. R. Astron. Soc.* 406, 1306-1317 (2010).

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## 8.4 Bücher

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## 8.5 Populärveröffentlichungen

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## 8.6 Vorträge, Astronomische Telegramme und Zirkulare, Poster

Von Mitarbeitern des MPE wurden im Jahre 2010 insgesamt 441 Vorträge auf Konferenzen, bei Seminaren und Kollquien und in der Öffentlichkeitsarbeit im In- und Ausland gehalten. Zusätzlich haben sie an insgesamt 123 astronomischen Telegrammen und Zirkularen mitgewirkt und 51 Postern 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 Kollquien) 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	162 (115)	6 (1)	14
Optische & Interpretative Astronomie	42 (25)	3 (0)	3
Hochenergieastrophysik	163 (98)	114 (83)	21
Theorie / Komplexe Plasmen	74 (36)	0 (0)	13

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 "Veröffentlichungen" eingesehen werden.

## 8.7 Öffentlichkeitsarbeit

Das MPE engagiert sich auch in der Öffentlichkeitsarbeit. Im Jahre 2010 hielten MPE-Wissenschaftler 24 Vorträge vor einem Laien-Publikum (z.B. an Schulen, Planetarien, bei Astronomischen Vereinigungen). In Institutsführungen wurde 22 Gruppen von bis zu 30 Personen, hauptsächlich Schüler und Lehrer von naturwissenschaftlich orientierten Schulen, das Institut und seine Arbeit erläutert. Am "Girl's Day" informierten sich 50 Mädchen über das MPE und 14 Schüler/innen erhielten in ein- oder zweiwöchigen Praktika einen Einblick in die Arbeitswelt von Plasma- und Astrophysikern.

Ralf Bender