

ANNUAL STATISTICS  
2021



## **Imprint**

Publisher: Max Planck Institute for extraterrestrial Physics

Editor and Layout: T. Herrmann, B. Niebisch

## Personnel 2021

### Directors

Prof. Dr. R. Bender, Optical and Interpretative Astronomy, also Professor for Astronomy/Astrophysics at the Ludwig Maximilians University, Munich

Prof. Dr. P. Caselli, Center for Astrochemical Studies (managing director)

Prof. Dr. R. Genzel, Infrared and Submillimeter Astronomy, also Prof. of Physics, University of California, Berkeley (USA)

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Prof. Dr. G. Morfill (emeritus)

Prof. Dr. K. Pinkau (emeritus)

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### Junior Research Group

Dr. S. Spezzano

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Dr. E. Redaelli

### Manager's Assistant

Dr. D. Lutz

### Press Officer

Dr. H. Hämmerle

### External Scientific Members

Prof. Dr. E. van Dishoeck, Leiden Observatory (The Netherlands), MPE

Prof. Dr. John Kormendy, Univ. of Texas at Austin (USA)

Prof. Dr. R. Z. Sagdeev, Univ. of Maryland (USA)

Prof. Dr. M. Schmidt, CALTECH, Pasadena (USA)

Dr. Karl Schuster, IRAM, Grenoble (France)

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Prof. Dr. T. de Zeeuw, Leiden Observatory (The Netherlands), MPE Senior Associate Scientist

### Curators (together with the MPI for Astrophysics)

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Dr. R. Breuer, former Editor-in-Chief of 'Spektrum der Wissenschaft', Heidelberg

Prof. Dr. P. Ehrenfreund, Chair of the DLR Executive Board (German Aerospace Center), Cologne

MdB F. Hahn, member of the Bundestag, Berlin

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Dr. F. Merkle, OHB System AG, Bremen

Dr. U. von Rauchhaupt, Frankfurter Allgemeine Zeitung, Frankfurt/Main

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GmbH & Co. KG, Munich

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Prof. Dr. G. J. Stacey, Cornell University, Ithaca (USA)

### Interdisciplinary Members of the Advisory Board

Prof. Dr. C. Cesarsky, Commissariat à l'Énergie Atomique, France, Saclay-Paris (France)

Prof. Dr. J. Peacock, Universität Edinburgh (UK)

### Scientific Honours, Appointments

Eisenhauer, F.: Tycho Brahe Medal, European Astronomical Society, Genf, Switzerland, March 2021.

Redaelli, E.: Otto Hahn Medal 2020, Max Planck Society, Munich, Germany, April 2021.

Predehl, Peter: MPE shares Institutional Marcel Grossmann Award for development of eROSITA aboard SRG, International Center for Relativistic Astrophysics, Rome, Italy, July 2021.

van Dishoeck, E.: Member, Pontifical Academy of Sciences, Vatican City, Vatican, August 2021.

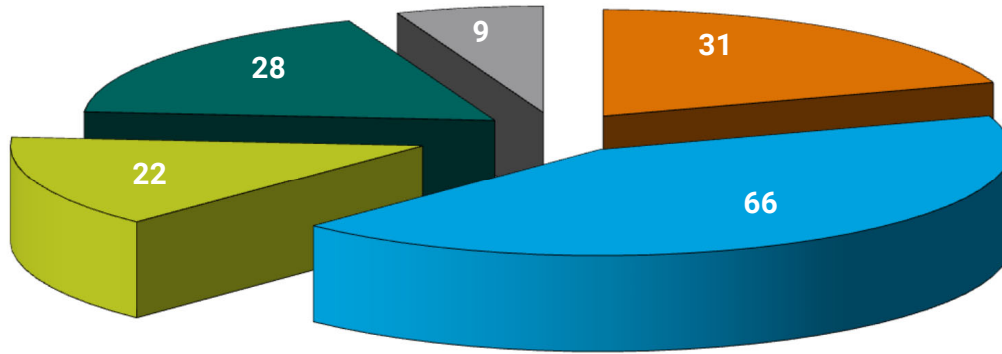
Eisenhauer, F.: Stern Gerlach Medal, Deutsche Physikalische Gesellschaft (DPG), Bad Honnef, Germany, November 2021.

Eisenhauer, F.: Foreign Associate, Académie des Sciences, Paris, France, December 2021.

Eisenhauer, F.: Jackson-Gwilt Medal, Royal Astronomical Society, London, United Kingdom, December 2021.

## Science Groups

### Staff Members by Science Group



■ Infrared    
 ■ HE-Astrophysics    
 ■ CAS    
 ■ OPINAS    
 ■ Research Groups

#### Infrared and Submillimeter Astronomy

Secretary: Richter, A.

Team Assistants: Dengler, S.; Hagedorn, I. (since 01.03.); Kleiser, A.; Zanker-Smith, J.

Bauböck, Dr. M. (until 31.07.); Biondi, Dr. F.; Bourdarot, Dr. G. (since 01.11.); Cao, Dr. Y. (since 01.07.); Coogan, Dr. R.; Dallilar, Dr. Y.; Davies, Dr. R.; Eisenhauer, Dr. F.; Feuchtgruber, Dipl.-Phys. H.; Förster Schreiber, Dr. N.; Gillessen, Dr. S.; Habibi, Dr. M. (until 15.10.); Kravchenko, Dr. K.; Lee, Dr. M. (until 15.10.); Liu, Dr. D.; Lutz, Dr. D.; More, N.; Ott, Dr. T.; Poglitsch, Dr. A. (beurlaubt); Price, Dr. S.; Rabien, Dr. S.; Schrubba, Dr. A. (until 31.10.); Shanguan, Dr. J.; Shimizu, Dr. T.; Stadler, Dr. J. (until 30.09.); Straub, Dr. O. (until 30.11.); Sturm, Dr. E.; Tacconi, Dr. L.; Widmann, Dr. F. (since 01.11.); Übler, Dr. H. (until 15.05.); Yazici, Dr. S.

#### Guests

Riccardi, Dr. A. (14.-18.06., 21.-24.6., 05.-08.10.); Puglisi, Dr. A. (14.-18.06.); Grani, Dr. P. (21.-24.06., 05.-08.10.); Gardner, T. (05.-08.10.); Selmi, Dr. C. (05.-08.10.); Brugnolli, Dr. R. (05.-08.10.); Schuster, Dr. K. (18.-22.10.); Renzini, Prof. A. (21.-30.10.); Nestor, A. (14.-22.11.); Gurman, A. (14.-22.11.); Contursi, Dr. A.; van Dishoeck, Prof. E.; Finger, Dr. Gert; Sternberg, Prof. A.; Tamburo, P.; de Zeeuw, Prof. T.

#### PhD (D.) / Master (M.)

Bettoni, G. (since 04.10., D., van Dishoeck); Bolzer, M.-L., (until 30.09., M., Eisenhauer); Drescher, A. (until 19.05., M., since 17.06., D., Eisenhauer); Fellenberg von, S. (until 31.12., D., Eisenhauer/Gillessen); Lee, L. Y.-L., (D., Tacconi, Förster-Schreiber); Kaltenbrunner, D. (until 10.08., M. Shimizu); Mang, F. (since 15.10., M., Eisenhauer); Santos, D. (since 01.09., D., Shimizu/Lutz); Wölfer, L. (until 15.10., D., van Dishoeck); Young, A. (until 31.12., M., Gillessen)

#### High-Energy Astrophysics

Secretary: Boller, B.

Team Assistant: Frankenhuizen, W.

Altmann, A. (since 01.6.); Andritschke, Dr. R.; Antonelli, V.; Arcodia, R. (since 01.10.); Becker, Dr. W.; Behrens, Dr. A.; Beitler, C.; Berlato, F. (until 31.12.); Boller, Prof. Dr. Th.; Bonholzer, M.; Bradshaw, Dr. M. (until 30.04.); Brunner, Dr. H.; Buchner, Dr. J.; Bulbul, Dr. E.; Burgess, Dr. M.J.; Burkert, Dr. W.; Buron, A.; Burwitz, Dr. V.; Carpano, Dr. S. (until 31.12.); Chitham, I. J. (since 01.11.); Comparat, Dr., J.; Dennerl, Dr. K.; Eraerds, Dr. T. (until 30.04.); Eder, Dipl.-Ing. J.; Emberger, V.; Frank, J.; Freyberg, Dr. M.; Friedrich, Dr. P.; Friedrich, Dr. S.; Gaida, R.; Gatuzz, Dr. E. (until 14.07.); Ghirardini, Dr. V.; Gueguen, Dr. A.; Greiner, Dr. J.; Haberi, Dr. F.; Hartner, Dipl.Math. G.; Haase, Dr. J.; Hauser, G.; Keil, Dr. I.; Kienlin von, Dr. A.; Liu, Dr. A.; Liu, Dr. T.; Liu, Dr.

Z.; Locatelli, N. (since 01.11.); Maitra, Dr. Ch.; Malyali, A. (since 01.10.); Meidinger, Dr. N.; Merloni, Dr. A.; Müller, T.; Müller-Seidlitz, Dr. J.; Oser, J.; Osterhage, Dr. S.; Ott, S.; Pfeffermann, Dipl.-Phys. E.; Pietschner, D.; Predehl, Dr. P.; Ramos Ceja, Dr. M.; Rau, Dr. A.; Reiffers, Dr. J.; Rukdee, Dr. S.; Salvato, Dr. M.; Sanders, Dr. J.; Schmidt, T.; Schweingruber, A.; Siegert, T. (since 01.11.); Stieglitz, V.; Stewart, Dr. I.; Thi, Dr. W.-F.; Trümper, Prof. Dr. J.; Tsvetkova, Dr. A. (until 31.12.); Zhang, Dr. X.-L. (until 31.12.).)

### Guests

Bräuninger, Dr. H.; Coffey, D. (D., Salvato/ Boller); Collmar, Dr. W.; Diehl, Dr. R.; Fukuchi, H. (16.09.-10.11.); Gatuzz, Dr. E. (since 15.07.); Ichikawa, Prof. Dr., K., (since 15.03.); Noboriguchi, A. (16.09.-30.10.); Pfeffermann, E.; Pflugradt, J. (07.07.- 30.9.); Pietsch, W.; Scheck, D. (since 01.10.); Strong, Dr. A.; Schröder Dr. A.;

### PhD (D.) / Master (M.)

Bahar, E. (since 23.09., D., Bulbul); Baronchelli, L. (until 31.08., D., Nandra); Biltzinger, B. (D., Greiner); Bogensberger, D. (D., Nandra); Camilloni, F. (since 01.05., D., Becker); Fresco, A. (D., Merloni); Grau, M. (until 31.08., M., Salvato); Grotova, I. (until 31.12., D., A. Rau); Hecker, Y. (since 20.10., M., Greiner); Kaltenberger, D. (since 01.10, D., Haberl); Igo, Z. (since 01.10., D., Merloni); Kuhn, M. (M., Greiner); Lopez, N. (since 27.09., M., Buchner); Mayer, M. (D., Becker); Pawar, A. (since 01.11., M., Greiner); Pleintinger, M. (D., Diehl), Scheck, D. (until 30.09., M., Sanders); Shreeram, S., (until 31.08., M., since 01.10., D., Bulbul); Seppi, R. (D., Comparat); Schösser, E. (since 01.09., M., Greiner); Trost, M. (since 01.04., M., Greiner); Waddell, S. (D., Nandra, Boller); Weinberger, C. (until 30.09., D., Diehl); Willer, R. (since 01.06., D., Greiner); Wolf, J. (D., Salvato); Yeung, H.F., (since 17.09., D., Becker); Zhang, Y., (since 25.08., D, Ponti); Zheng, X. (D. Ponti)

### Optical and Interpretative Astronomy

Secretary: Ingram, C.

Bodendorf, Dr. C.; Böhringer, Prof. Dr. H.; Bohnet, Dipl. Phys. A.; Escartin, J.; Fabricius, Dr. M.; Farrow, Dr. M.; Gracia Carpio, Dr. J.; Grupp, Dr. F.; Haeuser, Dr. M. (until 31.04.); Hopp, Dr. U.; Katterloher, Dr. R.; Kluge, Dr. M.; Kruk, Dr. S. (since 01.10.); Paech, Dr. K.; Parikh, Dr. T.; Pezzotta, Dr. A.; Pulsoni, Dr. C.; Raison, Dr. F.; Saglia, PD. Dr. R.; Sanchez, Dr. A.; Snigula, Dr. J.; Steinwagner, Dr. J.; Subramanian, Dr. S.; Thomas, Dr. J.; Varga, Dr. T (until 30.09.); Weller, Prof. Dr. J.; Wetzstein, Dr. M.

### PhD (D.) / Master (M.)

Arth, A. (D., Bender); Bolze, R. (M., Bender); Clarke, J. (D., Blumhof, M. (M., Bender); Clarke, J. (D., Gerhard); DeNicola, S. (D., Saglia); Esposito, M. (D., Saglia); Fahrenschoen, V. (D., Saglia); Gong, L. (D., Bender); Jouili A. (M., Saglia); Kellermann, H. (D., Grupp); Kodric, M. (D., Bender); Krecker, K. (D., Fabricius); Kuhlberg, M. (D., Saglia); Lipka, M. (D., Saglia); Lippich, M. (D., Bender); Merghan, K. (D.,

Bender); Neureither B. (D., Thomas); Piccinelli, G. (M., Saglia); Seminaite, A. (D., Sanchez); Smolla, M. (D., Bender); Steuer, J. (D., Grupp); Wylie, S. (D., Gerhard)

### Center for Astrochemical Studies

Secretary: Langer, A.

de Oliveira Alves, Dr. F.; Endres, Dr. Ch.; Giuliano, Dr. B.M.; Gong, Dr. M.; Hsieh, Dr. T.-H.; Ivlev, Dr. A.; Jensen, Dr. S.; Jiménez Redondo, Dr. M.; Jusko, Dr. P.; Küffmeier, Dr. M.; Lattanzi, Dr. V.; Lin, Dr. Y.; Maureira Pinochet, Dr. M.J.; Nolan, Dr. Ch.; Pineda Fornerod, Dr. J.; Redaelli, Dr. E.; Schmiedeke Dr. A.; Segura-Cox, Dr. D. (until 30.09.); Silsbee, Dr. K.; Sipilä, Dr. O.; Spezzano, Dr. S.; Zampetaki, Dr. A. (until 31.05.)

### Guests

Collmar, Dr. W. (ab 01.01.); Gärtner, L. (01.04.-31.12.); Ginsburg, Prof. A. (14.07.-17.07.); Rab, Dr. Ch. (ab 06.08.)

### PhD (D.) / Master (M.)

Alberton, D. (D., Caselli); Carl, T. (until 31.03., M., Pineda Fornerod, Schmiedeke), Choudhury, S. (D., Caselli, Pineda Fornerod); Ferrer Asensio, J., (D., Caselli, Spezzano); Giers, K. (until 30.09., M., Spezzano); Giers, K. (ab 01.11., D., Caselli, Spezzano); Kruczkiewicz, F. (ab 01.02., D., Caselli); Müller, B. (D., Caselli, Giuliano); Riedel, W. (ab 01.06., D., Caselli, Redaelli); Tabatabaei Mazraeh No, F.S. (ab 19.04., D., Caselli, Redaelli); Valdivia Mena, M. T. (D., Caselli, Pineda Fornerod); Zamponi Fuentealba, J. (D., Caselli, Maureira Pinochet)

### Working Groups

#### Working Group Gerhard

Gerhard, Dr. O.; Pulsoni, Dr. C.

PhD Students: Clarke, J.; Wylie, S.

Master Student: Almanstoetter, P.

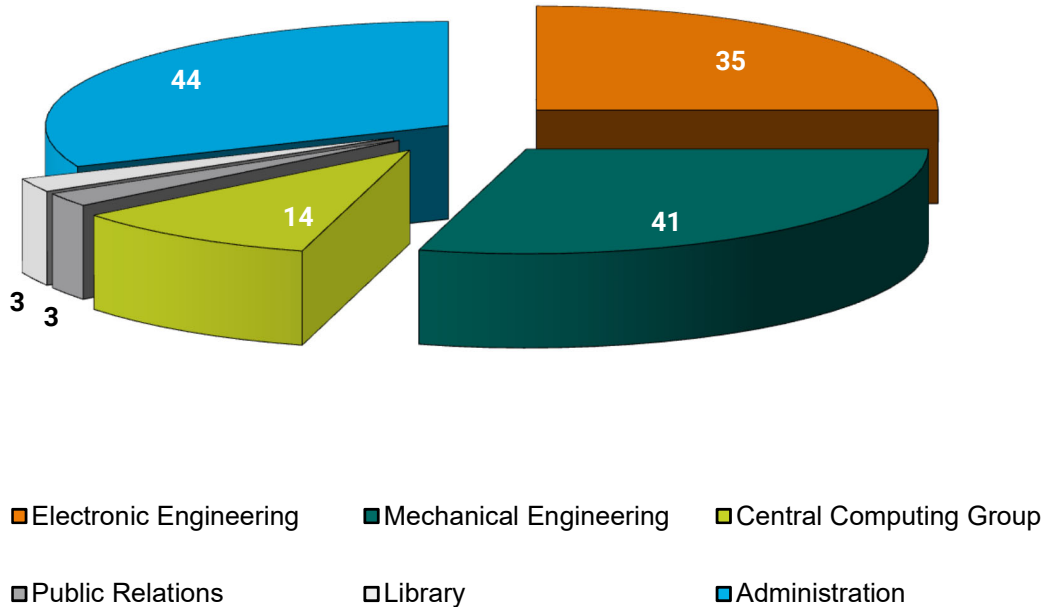
#### Working Group van Dishoeck

van Dishoeck, Prof. Dr. E.; Cridland, Dr. A. (until 15.10.); Hu, Dr. C.-Y.; Grant, Dr. S. (since 13.09.)

PhD Students: Wölfer, L. (until 14.10.); Bettoni, G. (since 04.10.)

## Engineering and Workshop

### Engineering, Workshops and Central Services Staff



#### Electronical Engineering

Plattner, Dr. M. (Head of Electronics until 30.06.); Albrecht, Dipl.-Ing. S. (Head of Electronics since 01.09.)

Barl, Dipl.-Ing. (FH) L.; Bechteler, Dr. T.; Besendörfer, A.; Bornemann, Dipl.-Ing. (FH) W.; Burghardt, Dipl.-Ing. (FH) T.; Buron, M.Sc. A.; Erhart, M.Sc.M.; Grabichler, M.Sc. J.; Hälker, Dipl.-Ing. (FH) O.; Hans, O.; Hartmann, K.; Kink, Dipl.-Ing. (FH) W.; Kshirsagar, M.Sc. T.; Mandla, M.Sc. C.; Müller, Dipl.-Ing. (FH) S.; Neumeier, M.Sc. L.; Rau, M.Sc. C.; Skvarc Bozic, M.Sc. G.; Schulte, Dr. W.; Uysal, S. Yaroshenko, V.; Zanker-Smith, J.; Ziegleder, Dipl.-Ing. (FH) J.

#### Electronical Workshop and Utilities Management

Oberauer, F. (Head)

Bachhuber, M.; Berger A.; Cibooglu, H.; Greßmann, R.; Kreibich, I.; Langer, P.; Özdemir, H.; Rupprecht, T.; Schneider, M.; Schneider R.

#### PhD (D.) / Master (M.)

Alexander, B. (M., Plattner); Annadevara, S. (M., Plattner)

#### Mechanical Engineering and Test Facilities

Schubert, Dr. J. (Head of Mechanics)

Antonelli, Dr.-Ing. V.; Bräuninger, M.Sc. K. (until 31.6.); Deysenroth, C.; Deysenroth, M.; Dittrich, Dipl.-Ing. (FH) K.; Emslander, A.; Geis, Dr. N.; Gemperlein, Dipl.-Phys. H.; Hartl, Dr. M.; Haußmann, F.; Hörmann, M.Sc. V.; Huber, Dipl.-Ing. H.; Mican, Dipl.-Ing. B.; Paßlack, Dipl.-Ing. (FH) S.; Pflüger, Dipl.-Ing. (FH) A.; Pietschner, Dipl.-Ing. (FH) D.; Rohe, C.; Strecker, R.; Frank, M.Sc. J.

#### Mechanical Workshop

Czempiel, S. (Head)

Bayer, R.; Berger, K. (since 01.02.); Brara, A.; Budau, B.; Eibl, J.; Feldmeier, P.; Folek L. (since 13.09.); Furchtsam, C.; Goldbrunner, A.; Hartwig, J.; Honsberg, M.; Huber, D.; Huber, F.-X.; Kestler, H.-J.; Knapp, S.; Krautz, C. (until 31.07.); Reinold, A. (until 15.10.); Sandmair, R.; Schunn, W.; Schuppe, D.; Soller, F.; Waldhör, F. (since 01.02.)

#### Apprentices

Beck, A. (since 01.09.); Furchtsam, S.; Heckmair, S.; Lindenmüller C. Loichinger, L.; Schaefer T. (since 01.09.); Stadler, B.; Stübig, M.

## **Student Assistants and Interns**

### ***Student Assistants***

Daniels, B.; El Mallah, A.; Faehling, M.; Farhan, M.;  
Haase, M.; Hannemann, L.; Hinderberger, P.; Huang, Q.;  
Kulashekara, S.; Paulus, S.; Saam, B.; Spagnolli, M.

### ***Work Experience (University)***

Glindemann, J. (14.07.-13.08.); Kirchhoff, T. (19.07.-  
06.08.); Marek, N. (until 28.02.); Reithmeier, J. (02.08.-  
13.08.)

### ***Work Experience (High School)***

Augustin, N.

## Central Services

### Central IT-Group

Bohnet, Dipl. Phys. A. (Head)

Agudo Berbel, A.; Baumgartner, H.; Kleiser, A.; Klose, L.; Kollmer, C.; Oberauer, A.; Ott, Dr. T.; Paul, J. (bis 31.05.2021); Piemonte, A.; Elsner, C.; Snigula, Dr. J.; Wieprecht, Dipl.-Ing. E.; Wiezorrek, Dipl.-Ing. (FH) E.

### Public Relations

Hämmerle, Dr. H.; (Head)

Herrmann, T. (since 11.01.); Niebisch, B.

### Library

Bartels, C. (Head)

Blank, E., Balicevic, M.

### IMPRS

Hilbert, A.

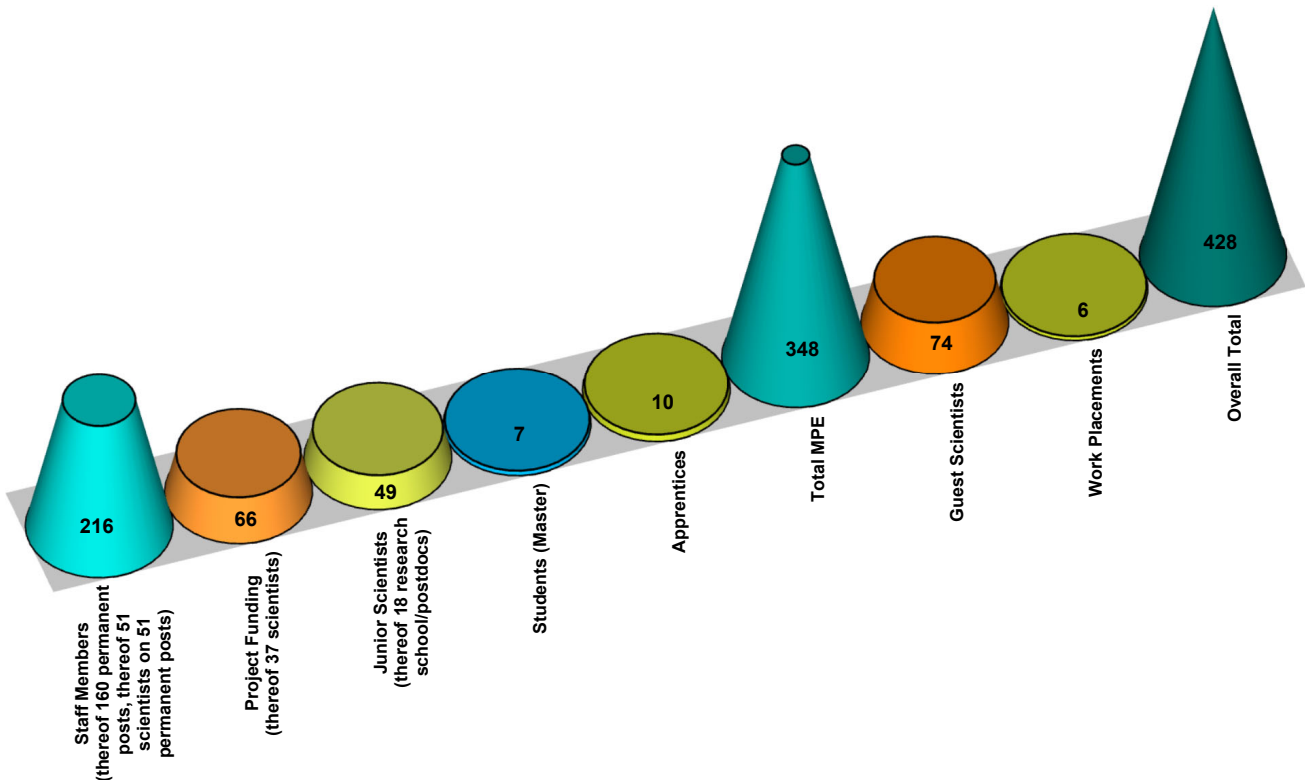
### Administration

Wanger, H. (Head VAD)

Secretary: Hesseler, G.

Apold, G. (until 31.12.); Arturo, A.; Ayari, S.; Bauer, T.; Belscak, L. (until 31.12.); Cziasto, U.; Eder, A.; Eicher, C.; Faust, T.; Gareva, L.; Goldbrunner, S.; Grohmann, M.; Hartung, I.; Hausmann, S.; Hidas, R.; Jäkel, T.; Jirsch, Y.; Kaps, S.; Keil, M.; Kestler, L.; Krapivina, A.; Kuhwald, E.; Maier, E.; Nagy, A.; Neun, A. (BR); Paschou, J.; Preisler, C.; Rochner, R. (until 28.02.); Rosenberger, S.; Sacher, A.; Schmidt, A.; Schwaiger, S.; Seyfarth, B.; Stock, C.; Stöckl, D.; Stricker, C.; Studier, S.; Thiess, F.; Thiess, L.; Üblacker, K.; Vogt, J.P. (until 31.05.); Zubanova, E. (since 12.04.)

## Personnel Statistics





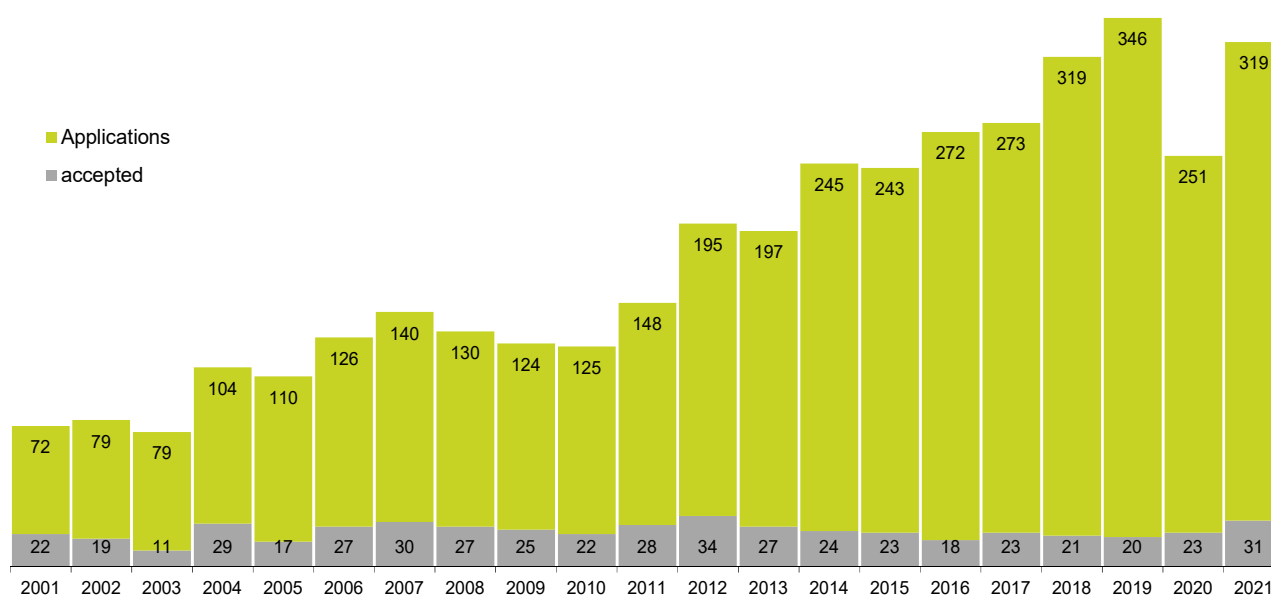
## International Max Planck Research School (IMPRS) for Astrophysics

The IMPRS for Astrophysics is a graduate school at the Ludwig Maximilians University (LMU) Munich. The school is a joint project of the Max Planck Institutes MPE and MPA (Max Planck Institute for Astrophysics) as well as the Observatory of the LMU Munich and the European Southern Observatory ESO. In the academic year 2021 a total of 97 students took part in the program, thereof 46

at the MPE. 319 students from 50 countries applied for the year 2021. 31 students were accepted, thereof 13 at the MPE.

As a rule, several PhD students from local universities join the program during the year, so that on average 25 PhD students take part per year.

### IMPRS Applications since 2001



Summary of annual applications for the IMPRS Program in Garching. Since its start in 2001, a total of 3897 students applied until 2021, 501 were accepted

### Public Relations Work

In 2020, the MPE engaged in the following PR activities: 33 public talks (in part online) by MPE scientists, 21 press releases on scientific results and general news (scientific prizes, awards). Due to the Covid-19 pandemic, activities at the institute were severely curtailed. Guided tours through the institute could not take place at all. Only a few internships were possible: 9 interns thereof 3 high school students were supervised in 2021. Furthermore, 14 student assistants worked at the MPE.

The Girls' Day 2021 took place online with several talks, a prerecorded guided tour through the laboratory, and a live stream from the workshop. A total of 50 girls participated.

Since June 2021 the MPE has its own Twitter account (@MPE\_Garching). On December 31, 2021, the account showed 760 followers and placed 322 tweets and re-tweets. The MPE LinkedIn account has also been looked after more intensively in 2021. By the end of the year, 1518 followers could be counted.

More information about the PR work at the MPE:

<http://www.mpe.mpg.de>

# Project Groups

(Project Lead underlined)

## Infrared and Submillimeter Astronomy

Deputy to the Director of the Group::

Lutz, Tacconi.

ERIS:

Buron, Dallilar, R. Davies, Dengler, M. Deysenroth, Eisenhauer, Feuchtgruber, Gemperlein, Hans, Hartl, Hartwig, D. Huber, H. Huber, Kleiser, Kravchenko, Mandla, Pflüger, Plattner, C. Rau, Schubert, Sturm, Wiezorrek.

GRAVITY, GRAVITY+:

Bauböck, Bolzer, Bourdarot, Buron, Cao, de Zeeuw, Dengler, Drescher, Eisenhauer, Genzel, Gillessen, M. Haase, Hartl, Haußmann, Lutz, Mandla, Mang, More, T. Ott, Pflüger, C. Rau, Santos, Schubert, Shangguan, Shimizu, Stadler, Straub, Sturm, Tacconi, Uysal, von Fellenberg, Widmann, Wieprecht, Wiezorrek, Yazici, Zanker-Smith.

LBT Argos:

Barl, Ric Davies, M. Deysenroth, Gemperlein, Rabien, Zanker-Smith, Ziegleder

MICADO:

Barl, Biondi, Cao, R. Davies, Dengler, J. Eder, Eisenhauer, Andreas Emslander, Förster Schreiber, Geis, Gemperlein, Genzel, Gillessen, Hartl, Haußmann, Hörmann, H. Huber, Kleiser, Kravchenko, Neumeier, Pflüger, Plattner, Rabien, Schubert, Sturm, Ziegleder.

Galactic Center:

Bauböck, Bourdarot, Dallilar, Eisenhauer, Genzel, Gillessen, Habibi, Mang, T. Ott, von Fellenberg, Stadler, Straub, Widmann, Young, de Zeeuw.

Galactic Nuclei:

Cao, R. Davies, Genzel, Kaltenbrunner, Lutz, Schrubba, Shangguan, Santos, Shimizu, Sturm, Tacconi, de Zeeuw.

Galaxies at High Redshift:

Cao, Coogan, Förster Schreiber, Genzel, Habibi, L. Lee, M. Lee, D. Liu, Lutz, Price, Schrubba, Sturm, Tacconi, Übler.

Star Formation:

Bettoni, Cridland, Grant, Hu, Schrubba, van Dishoeck, Wölfer.

## High-Energy Astrophysics

ATHENA/Mirror:

Bradshaw, Budau, Burwitz, Hartner, Langmeier, Müller, Passlack, Rukdee, Schmidt, .

ATHENA/WFI:

Albrecht, Andritschke, Antonelli, Behrens, Beitler, Bonholzer, Bornemann, Eder, Emberger, Eraerds, Frank, Freyberg, Haberl, Hälker, Hartmann, Hauser, Kink, Köglmeier, Lederhuber, Meidinger, Mican, Müller-Seidlitz, Nandra, Oser, Ott, Pietschner, Plattner, A. Rau, Reiffers, Schubert, Schweingruber, Strecker, v. Kienlin.

Chandra:

Burwitz, Predehl.

Einstein Probe/Detector:

Keil, Meidinger, Nandra.

Einstein Probe/Mirror:

Budau, Burwitz, Eder, Friedrich, Gaida, Hartmann, Hartner, Langmeier, Z. Liu, Müller, Passlack, Pfeffermann, Rohe, Rukdee, Schmidt, Schuppe, Stieglitz, .

eROSITA:

Andritschke, Becker, Boller, Bornemann, , Brunner, Budau, Burghardt, Bulbul, Burwitz, Carpano, Coutinho, Dennerl, Dittrich, Eder, Eibl, Emberger, Eraerds, Freyberg, P. Friedrich, S. Friedrich, Gaida, Goldbrunner, Gueguen, Haberl, Hälker, Hartmann, Hartner, F. Huber, Kink, Maitra, Meidinger, Merloni, Mican, S. Müller, Nandra, F. Oberauer, Pfeffermann, Pietschner, Predehl, Ramos-Ceja, Rau, Reiffers, Rohé, Rupprecht, Salvato, Schuppe, Soller, Stewart, Trümper, v. Kienlin, Yaroshenko.

ROSAT:

Boller, Freyberg, Haberl, Trümper.

Swift:

Greiner.

XMM-Newton:

Boller, Dennerl, Freyberg, Haberl, Meidinger, Trümper.

Fermi:

Collmar, Diehl, Greiner, v. Kienlin.

GROND:

A. Rau.

INTEGRAL:

Diehl, Greiner, v. Kienlin, Siegert, X.-L. Zhang.

MXT-SVOM:

Bradshaw, Burwitz, Budau, Hartner, Langmaier, Müller, Passlack, Meidinger, Nandra, Rukdee, Schmidt, A. Rau.

eXTP:

Altmann, Bechteler, Meidinger, Nandra, Yazici.

4MOST:

Comparat, Laas, Merloni, Salvato, Thi.

Active Galaxies:

Boller, Buchner, Collmar, Comparat, T. Liu, Merloni, Nandra, Salvato.

Clusters of Galaxies:

Buchner, Bulbul, Comparat, Dewlly, Gatuuz, Ghiradini, A. Liu, Locatelli, Ramos-Ceja, Sanders

eBOSS/SPIDERS:

Comparat, Merloni, Nandra, Salvato.

## Optical and Interpretative Astronomy

Large Scale Structure, eBoss, HETDEX:

Bender, Farrow, Fabricius, Hopp, Sanchez.

EUCLID:

Bender, Escartin, Fabricius, Garcia Carpio, Grupp, Kruk, Hartung, Raison, Saglia, Steinwagner, Wetzstein.

Galaxy Dynamics:

Bender, Gajda, Gerhard, Parikh, Saglia, Thomas.

INODE:

Bender, Fabricius, Subramanian.

GRAVITY+:

Bender, Fabricius

KMOS:

Bender, Saglia.

MICADO:

Bender, Fabricius, Grupp, Saglia, Thomas.

PanSTARRS:

Bender, Farrow, Hopp, Saglia.

Prime Focus Spectrograph:

Bender, Fabricius, Garcia Carpio, Sanchez.

Stellar Populations and Galaxy Formation:

Bender, Hopp, Parikh, Saglia.

## Center for Astrochemical Studies

Observations:

De Oliveira Alves, Hsieh, Jensen, Lin, Maureira Pinochet, Pineda Fornerod, Redaelli, Schmiedeke, Segura-Cox, Spezzano.

Theory:

Gong, Grassi, Ivlev, Nolan, Rab, Silsbee, Sipilä, Zhao.

Laboratory:

Endres, Giuliano, Jiménez Redondo, Jusko, Lattanzi, Spezzano.

## Teaching

### Departamento de Astronomía, Universidad de Concepción (Concepción, Chile)

Caselli, P.

Introduction to Astrochemistry. (WS 20/21)

### Goethe University Frankfurt (Frankfurt, Germany)

Boller, Th.

AGN Physics. (SS20)

Strahlung und Materie. (SS 21)

### IMPRS MPE Garching (Garching, Germany)

Boller, Th.

IMPRS Advanced Course on AGN Physics. (SS 21)

### LMU (Muenchen, Germany)

Saglia, R.

Essentials of astrophysics. (SS 21)

### Padua University (Padua, Italy)

de Zeeuw, T.

Dynamical Models for Galaxies. (SS 20)

### TUM (Garching, Germany)

Eisenhauer, F.

High Angular Resolution Astronomy: Telescopes, Adaptive Optics, Interferometry, and more. (SS 21)

Introduction to Astrophysics. (WS 21/22)

Introduction to Astrophysics. (WS 20/21)

## Organisation of Scientific Seminars / Conferences

Adaptive Optics for Astrophysics 4. Marseille, France, 14.06.-16.06.2021, Organisation: O. Beltramo-Martin, N. Thatte, R. Bacon, R. Davies, E. Moraux, J.-F. Sauvage, L. Schreiber, E. Tolstoy, J. Vernet.

Rock, Dust and Ice: Interpreting planetary data. Virtual, 23. - 26.03.2021, Organisation: A. Moullet, B. Bus, T. Mueller, E. Fayolle, A. Hendrix, M. MacAdam, B-G. Andersson, J. Jackson.

AAL/eROSITA collaboration workshop. Virtual, 15. - 17.02.2021, Organisation: M. Salvato, L. Chudczer, M. Filipovic, K. Nandra, D. Galloway, T. Reiprich.

The many faces of black hole accretion (EAS2021 Symposium). Virtual, 28.06. - 28.07.2021, Organisation: V. Impellizzeri, B. Trakhtenbrot, M. Koss, S. Aalto, L. Burtscher, P. Gandhi, D. Rosario, T. Shimizu, E. Sani, M. Salvato, C. Cicone, S. Paltani, M. Urry, M. Balokovic, A. Alonso Herrero, S. Hoenig.

NIFTy and GRAVITY imaging Crash Course. MPE, Garching, 24. - 27.08.2021, Organisation: MPE/MPA.

Rubin-Athena synergy. Virtual, 19. - 23.04.2021, Organisation: N. Brandt, S. Campana, N. Clerc, S. Allen, M. Salvato, K. Bechtol, A. Mahabal, A.R. Basu-zych.

Protostars and Planets VII. Kyoto, Japan, 21. - 27.03.2022 (postponed), Organisation: J. Alves, P. Andre, I. Baraffe, J. Carpenter, P. Caselli, W.-P. Chen, K. Dullemond, T. Guillot, A. Goodman, L. Hillenbrand, T. Henning, S. Ida, D. Johnstone, I. Kamp, M. Krumholz, J.-E. Lee, V. Meadows, M. Meyer, R. Nelson, T. Onishi, E. Ostriker, I. Pascucci, Y. Sekine, S. Tachibana, M. Tafalla, E. van Dishoeck, J. Williams.

European Astronomical Society 2021. Leiden (virtual), 28.06. - 02.07.2021, Organisation: J. Schaye - Chair, C. Aerts - Co-Chair, N. Aghanim, J. Brinchmann, P. Caselli, I. de Moortel, H. Falcke, J. Fynbo, E. Grebel, T. Guillot, L. Kaper, C. Lardo, S. Lucatello, G. Mellema, R. Morganti, H. Rauer, N. Rea, H. Rottgering, A. Różańska, R. Szabo, A. Vecchio, N. Werner.

Molecules in starless and pre-stellar cores: tools to understand low- and high-mass star-formation. Leiden (virtual), 01.07.2021, Organisation: Spezzano, Chair, P. Caselli, P. Schilke, M. Tafalla, J. Tan, C. Vastel, E. Wirström.

KROME BOOTCAMP 2021. Concepción (virtual), 22. - 26.02.2021 and 01. - 05.03.2021, Organisation: S. Bovino, P. Caselli, B. Ercolano, D. Galli, T. Grassi, D. Schleicher, D. Semenov.

Astrochemical Frontiers Quarantine Edition 2. Tokyo, Japan (virtual), 05. - 09.07.2021, Organisation: E. Bergin, P. Caselli, J. Jorgensen, Y. Aikawa, M. Cunningham, W. Geppert, K. Öberg, T. Millar.

GRAVITY+ Community Workshop. Garching (virtual), 24. - 25.02.2022, Organisation: L. Kreidberg, S. Hoenig, T. Shimizu, F. Eisenhauer, P. Garcia, J. Le Bouquin, D. Lutz, T. Paumard, C. Straubmeier.

MPE-ESO-LMU Star and Planet Formation Seminar. Webinar Series, 01.01. - 14.09.2021, Organisation: L. Tychoniec, D. Segura-Cox, T. Grassi.

## Publications

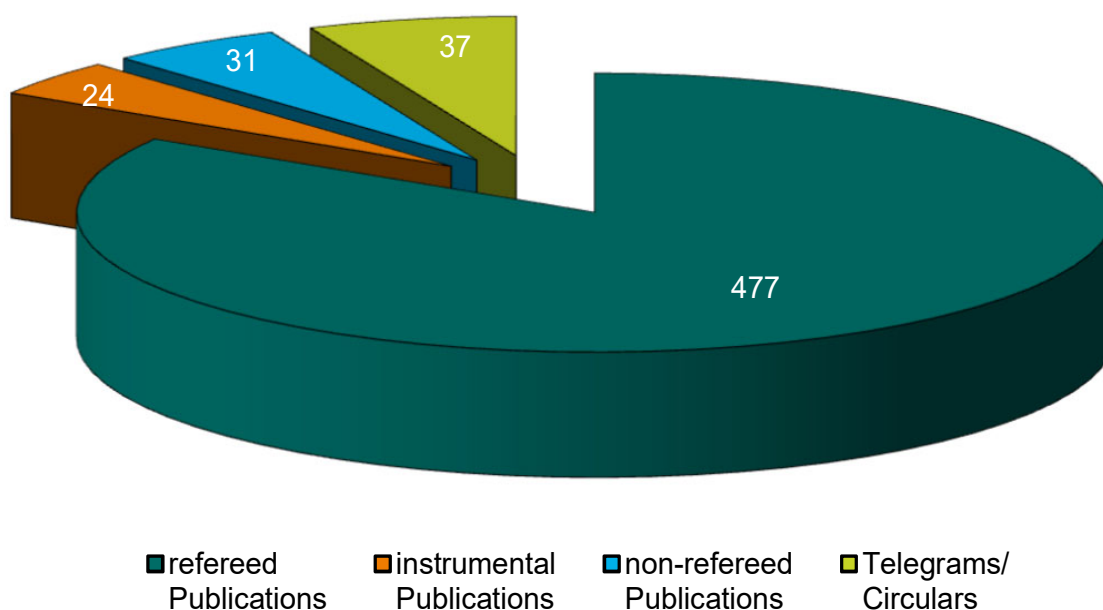
Here we present a tabular and graphical summary of our publication activities in 2021. The publications are counted by science group and publications type. The individual publications are listed consecutively.

### Summary of MPE Publications in 2021

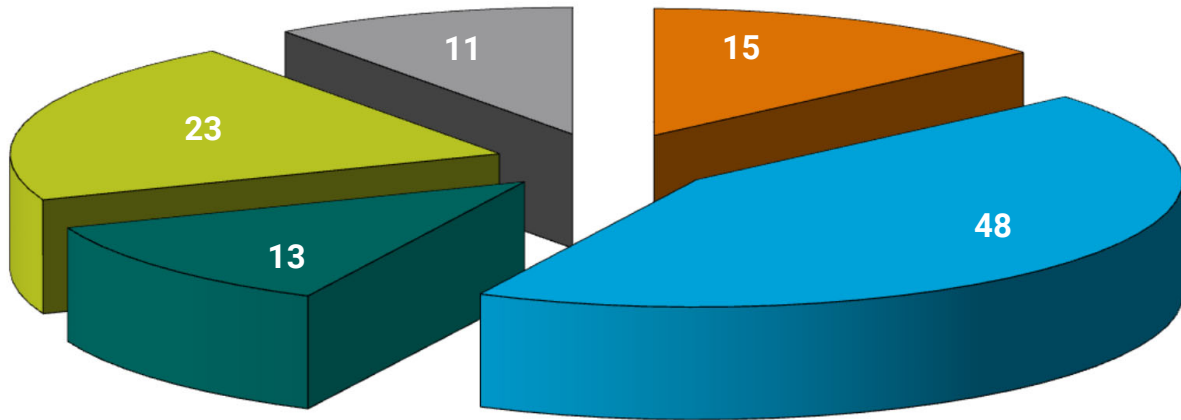
	Refereed Publications		Instrumental Publications		Not-Refereed Publications		Telegrams/Circulars		Talks		Poster
	First Author	All	First Author	All	First Author	All	First Author	All	Invited/Colloquium	All	Only First Author
<b>IR</b>	15	106	1	2	4	10	2	2	115	134	1
<b>HE-Astro-physics</b>	48	140	6	15	3	16	5	35	52	82	7
<b>OPINAS</b>	13	114	2	5	0	2	0	0	30	53	2
<b>CAS</b>	23	74	0	2	0	2	0	0	23	37	6
<b>Re-search Groups</b>	11	43	0	0	0	1	0	0	15	27	1
<b>Total</b>	110	477	9	24	7	31	7	37	235	333	17

The black entries give the number of publications with a first author from the MPE or invited talk, respectively. The red entries show the total number of publications with MPE contributions or talks (including the black numbers). Publications with contributions from more than one research group are counted for the group of the leading author. Posters are counted only if the first author is a MPE member.

### MPE Publications 2021 (by Type)

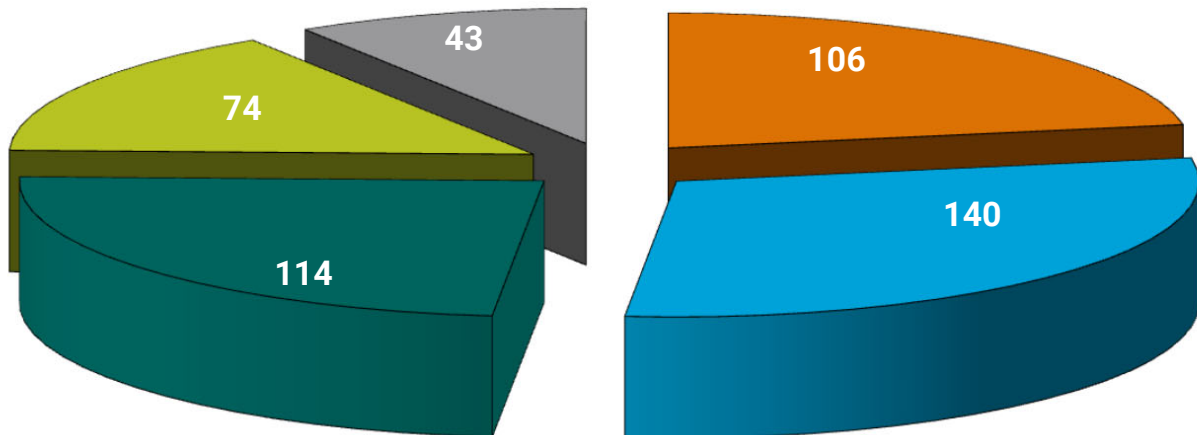


## Refereed Publications with MPE first author in 2021 (by Science Group)



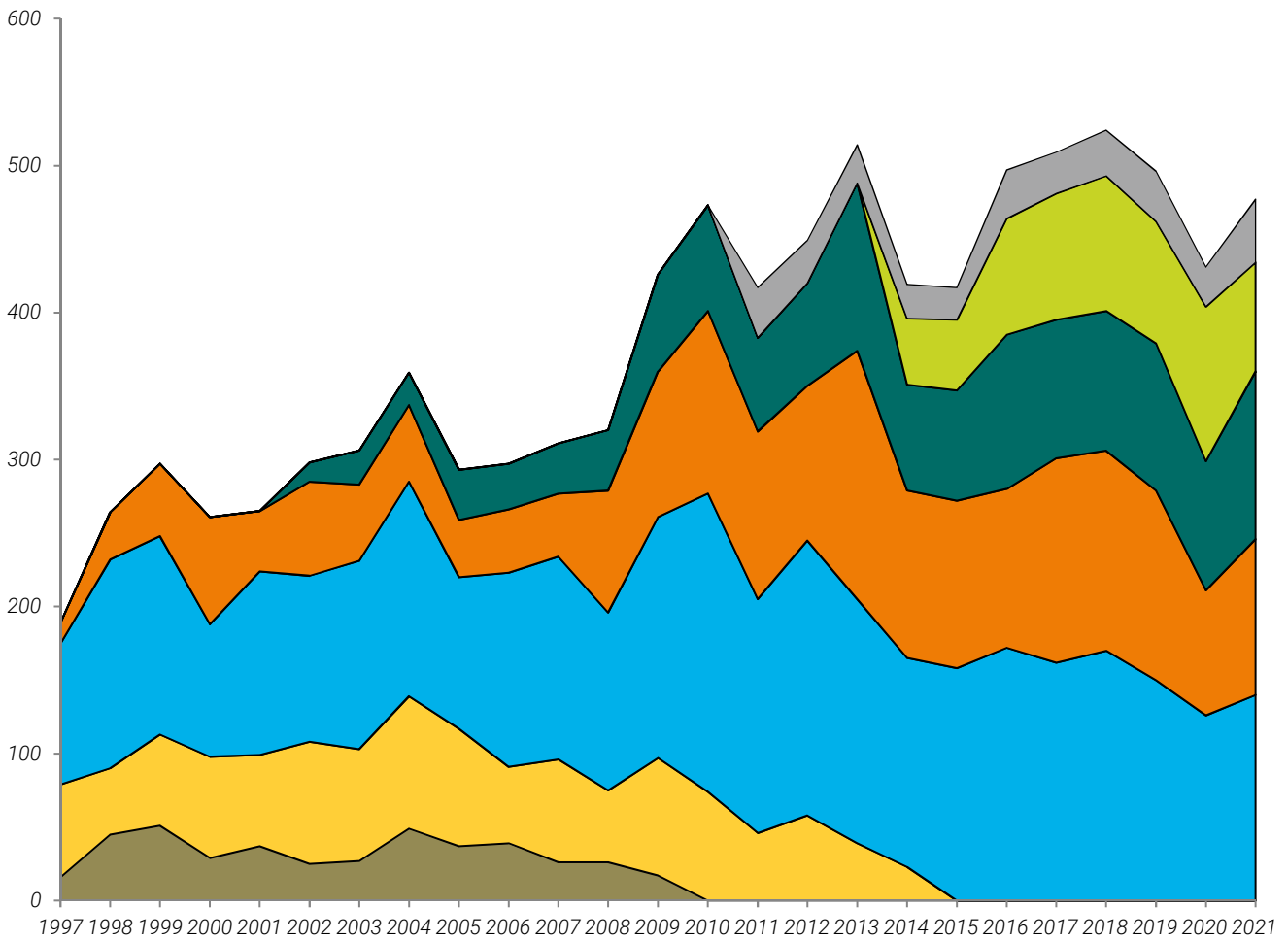
■ Infrared   ■ HE-Astrophysics   ■ OPINAS   ■ CAS   ■ Research Groups

## Total refereed MPE Publications in 2021 (by Science Group)



■ Infrared   ■ HE-Astrophysics   ■ OPINAS   ■ CAS   ■ Research Groups

## History of MPE Total Refereed Publications (by Science Group)



Space Plasma
  Theory
  HE-Astrophysics
  Infrared
  OPINAS
  CAS
  Research Groups

## Refereed Publications

- Abbott T., M. Adamów, M. Aguena, ..., T. Varga, ..., J. Weller, ..., Linea Science Server: The Dark Energy Survey Data Release 2. *Ap. J. Supp. Ser.* 255, 2 (2021).
- Adhikari S., T. Shin, B. Jain, ..., T.N. Varga, et al.: Probing Galaxy Evolution in Massive Clusters Using ACT and DES: Splashback as a Cosmic Clock. *Ap. J.* 923, 1 (2021).
- Alam S., M. Aubert, S. Avila, ..., J. Hou, ..., A.G. Sánchez, et al.: Completed SDSS-IV extended Baryon Oscillation Spectroscopic Survey: Cosmological implications from two decades of spectroscopic surveys at the Apache Point Observatory. *Physical Review D* 103, 8 (2021).
- Alam S., J.A. Peacock, D.J. Farrow, J. Loveday, A. Hopkins: Using GAMA to probe the impact of small-scale galaxy physics on nonlinear redshift-space distortions. *Mon. Not. R. Astron. Soc.* 503, 1 (2021).
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## Instrumental Publications

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- Kozyrev A., D. Golovin, M. Litvak, I. Mitrofanov, A. Sanin, Mgns/Bepicolombo Team, Hend/Mars Odyssey Team, J. Benkhoff, Bepicolombo Team, K. Hurley, Ipn, D. Svinkin, S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb

Team, W. Boynton, C. Fellows, K. Harshman, H. Enos, R. Starr, Grs-Odyssey Grb Team: IPN Triangulation of GRB 211019A. *GCN Circ.* 30993 (2021).

Kozyrev A., D. Golovin, M. Litvak, I. Mitrofanov, A. Sanin, Mgns/Bepicolombo Team, Hend/Mars Odyssey Team, J. Benkhoff, Bepicolombo Team, K. Hurley, Ipn, D. Svinkin, S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team, W. Boynton, C. Fellows, K. Harshman, H. Enos, R.G.G.T. Starr: IPN triangulation of GRB 211022A. *GCN Circ.* 31024 (2021).

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Liu, Z.: SRG/eROSITA detection of X-ray emission from TDE candidate AT 2021blz. *The Astronomer's Telegram (ATel)*, (2021).

Merloni A., : eROSITA on SRG: Mission status and AGN Surveys first results. *APS 2021* (2021).

Ridnaia A., S. Golenetskii, D. Frederiks, D. Svinkin, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team: IPN triangulation of GRB 210727A (short). *GCN Circ.* 30541 (2021).

Ridnaia A., S. Golenetskii, D. Frederiks, D. Svinkin, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, Integra SPI-ACS Grb Team, A. Goldstein, M. Briggs, C. Wilson-Hodge, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team: IPN triangulation of GRB 211118A. *GCN Circ.* 31138 (2021).

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Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team: IPN triangulation of GRB 211106A (short). *GCN Circ.* 31078 (2021).

Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, S. Xiao, S. Xiong, X. Li, Y. Huang, S. Zhang, Insight-Hxmt Team: IPN triangulation of GRB 210506A. *GCN Circ.* 29968 (2021).

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Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team: IPN triangulation of GRB 210624A (short). *GCN Circ.* 30318 (2021).

Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team: IPN triangulation of GRB 210605A (short). *GCN Circ.* 30143 (2021).

Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. von Kienlin, S. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team: IPN triangulation of GRB 210212B (consistent with ZTF21aakruew/AT2021c wd). *GCN Circ.* 29511 (2021).

Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Lysenko, T. Cline, Konus-Wind Team, K. Hurley, Ipn, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI ACS Grb Team, A. Goldstein, M. Briggs, C. Wilson-Hodge, Fermi Gbm Team, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuvavohu, Swift-Bat Team: IPN triangulation of GRB 211124A (short). *GCN Circ.* 31116 (2021).

Svinkin D., S. Golenetskii, D. Frederiks, A. Ridnaia, A. Ly-senko, T. Cline, Konus-Wind Team, P. Hurley, Ipn, S. Barthelmy, J. Cummings, H. Krimm, D. Palmer, A. Tohuva-vohu, Swift-Bat Team, A. von Kienlin, X. Zhang, A. Rau, V. Savchenko, E. Bozzo, C. Ferrigno, INTEGRAL SPI-ACS Grb Team: IPN Triangulation of a bright burst from SGR 1935+2154. GCN Circ. 30598 (2021).

Tacconi (chair), L. J.: Voyage 2050: Final Recommendations from the Voyage 2050 Senior Committee. Other journal, ESA Publications, (2021).

Wood J., A. von Kienlin, C. Meegan, Fermi GBM Team: GRB 210211A: Fermi GBM observation. GCN Circ. 29482 (2021).

von Kienlin A., Fermi GBM Team: Fermi GBM trigger 657780594/211105201 is not a GRB. GCN Circ. 31043 (2021).

von Kienlin A., C. Meegan, Fermi GBM Team: GRB 210626A: Fermi GBM observation. GCN Circ. 30340 (2021).

## Poster

Alberton, D.: Millimeter Laboratory Spectroscopy of Allylamine. ACO Astro Chemical Origins, Torino, Italy, September 2021.

Choudhury, S.: Ammonia as a tracer to probe the transition to coherence in dense cores. EAS 2021 Annual Meeting, Virtual Meeting, June/July 2021.

Choudhury, S.: Probing the transition to coherence. Star Formation: From Clouds to Discs, Malahide, Ireland, October 2021.

Comparat, J.: The final SDSS-IV/SPIDERS X-ray point source spectroscopic catalogue. European Astronomy Society, EAS, Virtual Meeting, Germany, June 2021.

Comparat, J.: The large-scale structure traced by simulated eROSITA AGN and Clusters. European Astronomy Society, EAS, Virtual Meeting, Germany, June 2021.

Coogan, R.: Galaxy evolution in clusters at  $z=2$ : starbursts, AGN, and the ICM. Formation and Evolution of Galaxy Clusters Across Cosmic Time, Tenerife, Spain, November 2021.

Endres, C.P.: The Soleil View on Dimethyl Ether. HRMS Cologne 2021 / I. Physikalisches Institut, Universität zu Köln, Cologne, Virtual Meeting, Germany, August 2021.

Ferrer Asensio, J.: HC170+ hyperfine emission in L1544: Observations and radiative transfer modelling. EAS Annual Conference, Virtual Meeting, June 2021.

Haase, J.: The SciServer at MPE - Enabling collaboration for eROSITA & HETDEX. Astronomical Data Analysis Software and Systems (ADASS XXXI), Cape Town, Virtual Meeting, South Africa, October 2021.

Kluge, M.: Structure of Brightest Cluster Galaxies and Intracluster Light. EAS Annual Meeting, Leiden, Netherlands, remote, June 2021.

Kluge, M.: Data reduction techniques for preserving the faint outskirts of largely extended sources. EAS Annual Meeting, Leiden, Netherlands, remote, June 2021.

Liu, T.: Characterizing the eFEDS X-ray point-source catalog with simulation and spectral analysis. EAS2021 conference, Virtual Meeting, July 2021.

Ramos-Ceja, M. E.: X-ray properties of shear-selected clusters in the eFEDS footprint. A multi-wavelength view of galaxy clusters: Deriving masses in the era of wide-field surveys, Virtual Meeting, September 2021.

Sanders, J.: MBProj2 and MBProj2D: Forward modelling of X-ray cluster data to obtain profiles and masses. A multi-wavelength view of galaxy clusters: deriving masses in the era of wide-field surveys, European Space Agency, Virtual Meeting, September 2021.

Spezzano, S.: Methanol GEMS: An extensive study on methanol towards starless cores in Taurus. EAS2021, Virtual Meeting, June 2021.

Wolf, J.: First constraints on the AGN X-ray luminosity function at  $z\sim 6$  from an eROSITA detected quasar. EAS, Leiden, Virtual Meeting, The Netherlands, June 2021.

Wölfer, L.: Spiral structure in the gas disc of CQ Tau. EAS 2021 Leiden, virtual conference, June/July 2021.

## Talks

Alberton D: Laboratory Spectroscopy for Astrochemistry: a Rotational Investigation of 3-AMINO-2-PROPENENITRILE. Contributed Talk, 2021 International Symposium on Molecular Spectroscopy, Virtual Meeting, June 2021.

Alves, F. O.: Growing stars and planets in the furrows of Barnard 59. Contributed Talk, European Astronomical Society Annual Meeting, Virtual, June 2021.

Arcodia, R.: eROSITA discoveries of Quasi-Periodic Eruptions. Contributed Talk, European Astronomical Society Annual Meeting, Leiden, Netherlands, July 2021.

Arcodia, R.: eROSITA discoveries of Quasi-Periodic Eruptions from two previously quiescent black holes. Contributed Talk, European Astronomical Society Annual Meeting, Leiden, Netherlands, July 2021.

Arcodia, R.: X-ray blasts from two previously quiescent galaxies. Contributed Talk, 16th Marcel Grossmann Meeting, Virtual, July 2021.

Arcodia, R.: New discoveries of variable supermassive black holes with eROSITA. Invited Talk, EAS 2021 (Press Conference dedicated to eROSITA EDR), Leiden (remote), The Netherlands, June 2021.

Behrendt, M.: What is the life time of clumps in high-z galaxies? Contributed Talk, Ringberg Meeting: The Puz-zles of Starformation, Schloss Ringberg, Germany, June 2021.

Biltzinger, B.: GRB spectroscopy with PySPI and physical models. Contributed Talk, INTEGRAL: towards the third decade of X and Gamma ray observations, Pula, Italy, October 2021.

Boehringer, H.: Application of X-ray Spectroscopy in As-trophysics. Invited Talk, Lecture in honor of Prof. Chintamani Mandi, University of Nagpur, India, December 2021.

Boller, Th.: Was wissen wir über Schwarze Löcher. Public Talk, VHS Hallbergmoos, Hallbergmoos, Germany, June 2021.

Boller, Th.: Die wahre Geschichte des Sterns von Bethlehem aus astronomischer Sicht. Public Talk, VHS Hallbergmoos, Hallbergmoos, Germany, December 2021.

Boller, Th.: eROSITA discovery of ultra-soft X-ray variability in the Narrow-Line Seyfert 1 Galaxy 1H0707-495. Contributed Talk, 43th COSPAR Scientific Assembly, Sydney, Australia, January 2021.

Bulbul, E: Galaxy Groups and Clusters in the eROSITA Final Depth Equatorial Survey. Invited Talk, Radio 2021 and GLOW Annual Assembly, Garching, Germany, November 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters Detected in the eFEDS Field. Invited Talk, American Physical Society Physics Meetings, Online, USA, April 2021.

Bulbul, E: First Results from eROSITA Observations of

Galaxy Clusters Detected in the eFEDS Field. Invited Talk, Marcel Grossman Meeting of Relativistic astrophysics, Online, USA, October 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters Detected in the eFEDS Field. Invited Talk, International School of Astrophysics Daniel Chalonge, Paris, France, October 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters Detected in the eFEDS Field. Colloquium, Strasbourg Observatory, Strasbourg, France, December 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters Detected in the eFEDS Field. Invited Talk, European Astronomical Society Meeting, Leiden, Netherlands, June 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters. Colloquium, NASA Goddard Space Flight Center, Greenbelt, USA, May 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters. Colloquium, University of Edinburgh, Royal Observatory, Edinburgh, Scotland, October 2021.

Bulbul, E: First Results from eROSITA Observations of Galaxy Clusters. Colloquium, University of California Santa Cruz, Santa Cruz, USA, October 2021.

Bulbul, E: eFEDS as a Preview of the eROSITA Cluster Survey. Invited Talk, EAS2021 (Press Conference Dedicated to the eROSITA EDR), Virtual, July 2021.

Burkert, A.: Urknall und Sternenstaub. Public Talk, Aalen, March 2021.

Burkert, A.: Ein Nobelpreis für Schwarze Löcher. Public Talk, Petershausen, remote, May 2021.

Burkert, A.: Physik des Universums. Public Talk, Pfaffenhofen, July 2021.

Burkert, A.: Wir sind nicht allein. Public Talk, Langeoog, August 2021.

Burkert, A.: Urknall und Sternenstaub. Public Talk, Langeoog, August 2021.

Burkert, A.: Urknall, Schwarze Löcher und die Entstehung des Universums. Public Talk, TUM, Garching, October 2021.

Burkert, A.: The Pythagorean Music of Celestial Spheres and modern astronomy. Public Talk, EAS, remote, October 2021.

Burkert, A.: Dynamik des Universums. Public Talk, Frutigen, Schweiz, October 2021.

Burkert, A.: Urknall und Sternenstaub. Public Talk, Gersfeld, Germany, October 2021.

Burkert, A.: Urknall und Sternenstaub. Public Talk, Calw, Germany, October 2021.



- Burkert, A.: Urknall und Sternenstaub. Public Talk, Edenkoben, Germany, October 2021.
- Burkert, A.: Urknall und Sternenstaub. Public Talk, Amorbach, Germany, October 2021.
- Burkert, A.: Was ist der Mensch? Public Talk, München, November 2021.
- Burkert, A.: Urknall, Sternenstaub und die Frage nach dem Leben. Public Talk, Berlin, December 2021.
- Burkert, A.: Collapsing sheets the power of the edge effect. Invited Talk, Dublin, October 2021.
- Burkert, A.: Physics of Galaxy Formation. Invited Talk, Frankfurt, remote, December 2021.
- Burkert, A.: The puzzles of Star formation, The puzzles of the universal gas depletion timescale. Contributed Talk, Schloss Ringberg, Germany, 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth, UK, February 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, School of Physics and Astronomy, University of St. Andrews, St. Andrews, UK, March 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, The Department of Astronomy and Astrophysics, The Pennsylvania State University, University Park, PA, USA, March 2021.
- Caselli, P.: From clouds to planets, the astrochemical link. Colloquium, Institute for Theory and Computation, Harvard University, Cambridge, MA, USA, April 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, Origins Center, Groningen, The Netherlands, May 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, Scuola Normale Superiore, Pisa, Italy, May 2021.
- Caselli, P.: Our Astrochemical Origins. Colloquium, Instituto de Astrofísica, Pontificia Universidad Católica de Chile, Santiago, Chile, September 2021.
- Caselli, P.: From clouds to planets, the astrochemical link. Colloquium, Dipartimento di Fisica, Università di Tor Vergata, Roma, Italy, December 2021.
- Caselli, P.: Astrochemistry at the dawn of star and planet formation. Invited Talk, Faraday joint interest group conference 2021, Sheffield, UK, March 2021.
- Caselli, P.: Almost complete freeze-out before stellar birth. Invited Talk, CICO-VICO-CASSUM Spring Workshop 2021, Charlottesville, VA, USA, May 2021.
- Caselli, P.: From pre-stellar cores to protoplanetary disks. Invited Talk, Ringberg Meeting: Puzzles of Star Formation, Ringberg, Germany, July 2021.
- Caselli, P.: From clouds to planets: the astrochemical link. Invited Talk, ngVLA Summer Short Talk Series, Charlottesville, VA, USA, July 2021.
- Caselli, P.: Molecular fractionation in star- and planet-forming regions. Invited Talk, Chemical processes in Solar-type star forming regions, Torino, Italy, September 2021.
- Caselli, P.: Perspective Talk. Invited Talk, MIAPP - Gaps, rings, spirals and vortices: structure formation in planet-forming disks, Garching, Germany, October 2021.
- Clarke, J.: Galactic Centre and Inner Galaxy. Contributed Talk, MW-Gaia Workshop 2021, Heidelberg, Germany, Virtual Meeting, February 2021.
- Clarke, J.: Galactic Centre and Inner Galaxy. Contributed Talk, EAS2021, Leiden, Netherlands, Virtual Meeting, July 2021.
- Collmar, W.: COMPTEL Reloaded - An updated View on the MeV Sky. Contributed Talk, Ninth International Fermi Symposium (held virtually), Johannesburg, South Africa, April 2021.
- Comparat, J.: The cosmic web of X-ray AGNs. Colloquium, Cosmology Seminar at Max Planck fuer Astrophysik, Garching bei München, Germany, May 2021.
- Comparat, J.: Mapping large scale structures in X-rays: cosmological forecast. Invited Talk, Cosmology from home, Mexico, Virtual, July 2021.
- Comparat, J.: Full-Sky Photon Simulation of Clusters and Active Galactic Nuclei in the Soft X-Rays for eROSITA. Contributed Talk, National astronomy meeting 21 (RAS), Bath, UK, July 2021.
- Comparat, J.: Forward modelling the cosmological large scale structure seen in the X-ray by eROSITA. Contributed Talk, Cluster mass 2020 @ ESAC, Madrid, Spain, September 2021.
- Coogan, R.: Environmental effects on galaxy evolution in a  $z=2$  cluster. Contributed Talk, Confronting simulations with observations of high-redshift galaxies and (proto) clusters, Nanjing (virtual), China (virtual), November 2021.
- Coogan, R.: ClJ1449: excited galaxies and multiple radio jets in the core of a mature galaxy cluster at  $z=2$ . Contributed Talk, Galaxy Cluster Formation II, Garching (virtual), Germany, June 2021.
- Davies, R.: An extremely sharp view of AGN with the Extremely Large Telescope. Invited Talk, The many faces of black hole accretion, Leiden, Netherlands, July 2021.
- Dennerl, K.: Calibration of eROSITA. Contributed Talk, EPIC Calibration Meeting, virtual, April 2021.
- Dennerl, K.: First Results and Calibration of eROSITA. Invited Talk, IACHEC Special Plenary Talk, virtual, April 2021.
- de Zeeuw, T.: Astro2020. Invited Talk, IR Group Ringberg Retreat, Ringberg, Germany, December 2021.
- de Zeeuw, T.: A Muse for Mount Olympos. Colloquium, Institute for Astrophysics, Heraklion, Greece, October 2021.
- de Zeeuw, T.: Fornax3D. Colloquium, Teatalk at the MPE, Garching, Germany, February 2021.
- Drescher, A.: First Observations with GRAVITY Wide. Contributed Talk, NYRIA Virtual Workshop, Garching, Germany, October 2021.

Eisenhauer, F.: Follow Tycho Brahe: Precision Astronomy with Interferometry. Invited Talk, Danish Institute for Advanced Study, University of Southern Denmark, Odense, Denmark, November 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY+. Invited Talk, Scientific Technical Committee (STC) and La Silla Paranal Committee, European Southern Observatory (online), Garching, Germany, October 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY(+). Invited Talk, IPAG - Institut de Planétologie et d'Astrophysique, Grenoble, France, October 2021.

Eisenhauer, F.: Great Times Ahead. Invited Talk, European Southern Observatory 2020 Nobel Prize Celebration (online), Santiago de Chile and Garching, Chile and Germany, September 2021.

Eisenhauer, F.: Infrared Interferometry of the Galactic Center Black Hole. Invited Talk, Virtual Annual Meeting of the German Astronomical Society, Hamburg, Germany, September 2021.

Eisenhauer, F.: An Experimentalists View on Black Holes and Gravity – the Galactic Center Black Hole. Invited Talk, 20th Lomonosov Conference (online), Moscow, Russia, August 2021.

Eisenhauer, F.: GRAVITY+ All-Sky, High-Contrast, Milli-Arcsecond Optical Interferometric Imaging and Spectroscopy. Invited Talk, European Astronomical Society Annual Meeting (online), Leiden, The Netherlands, June 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY. Invited Talk, Heidelberg Joint Astronomical Colloquium (online), Heidelberg, Germany, June 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY. Invited Talk, University of Vienna, Astrophysics Colloquium (online), Vienna, Austria, June 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY. Invited Talk, Sydney Institute for Astronomy, The University of Sydney (online), Sydney, Australia, April 2021.

Eisenhauer, F.: Infrared Interferometry of the Galactic Center Black Hole. Invited Talk, Extreme Gravity Mini Symposium, Erlangen Centre for Astroparticle Physics, Friedrich-Alexander Universität Erlangen-Nürnberg (online), Erlangen, Germany, April 2021.

Eisenhauer, F.: A New Era of Interferometry with GRAVITY. Invited Talk, Dunlap Institute for Astronomy & Astrophysics Colloquium, University of Toronto (online), Toronto, Canada, March 2021.

Eisenhauer, F.: GRAVITY+ – All-Sky, High-Contrast, Milli-Arcsecond Optical Interferometric Imaging and Spectroscopy. Invited Talk, The Infrared Sky at Milli- and Microarcsecond Resolution with GRAVITY+ Online Workshop (online), Garching, Germany, February 2021.

Eisenhauer, F.: Next Decade of Galactic Center Black Hole Observations with Infrared Interferometry and 30-40m Telescopes. Invited Talk, Next Generation EHT Con-

ference 2021 (online), Cambridge, MA, USA, February 2021.

Eisenhauer, F.: General Relativistic Effects in Stellar Orbits around the Galactic Center Black Hole with GRAVITY. Invited Talk, Revealing the Milky Way with GAIA workshop (online), Heidelberg, Germany, February 2021.

Eisenhauer, F.: The Discovery of the Massive Black Hole in the Center of the Galaxy. Invited Talk, Iberian String 2021 (online), Lisbon, Portugal, January 2021.

Eisenhauer, F.: GRAVITY+: All-Sky, High-Contrast, Milli-Arcsecond Optical Interferometric Imaging and Spectroscopy. Invited Talk, DIAS Astronomy & Astro-physics Seminar (online), Dublin, Ireland, January 2021.

Eisenhauer, F.: Recent GRAVITY Results on the Galactic Center Black Hole. Invited Talk, 43rd COSPAR Scientific Assembly (online), Sydney, Australia, January 2021.

Endres, C.P.: Automatic Spectral Assignment Procedure ASAP - Application to complex spectra of chiral molecules. Invited Talk, SFB1319 Winterschool 2021 / Universität Kassel, Kassel, Germany, December 2021.

Esposito, M.: Weighing Cosmic Structures with Clusters of Galaxies and the Intergalactic Medium, Invited Talk, Large Scale Structure Seminar, Cambridge, UK, 2021.

Farrow, D.: Correcting correlation functions for redshift dependent interloper contamination. Invited Talk, HEZ Board Meeting, remote, June 2021.

Forster Schreiber, N. M.: Galaxy Evolution at the Peak Epoch of Cosmic Star Formation: Witnessing In-situ the Growth and Transformations of Young Galaxies. Colloquium, Seoul National University, Dept. of Physics and Astronomy, Seoul, South Korea, May 2021.

Forster Schreiber, N. M.: Galaxy evolution: an observational perspective. Invited Talk, Workshop on Massively Parallel Large Area Spectroscopy from Space, Porto, Portugal, June 2021.

Genzel, R.: Über die Galaxie zum Nobelpreis. BADW-Gesprächsreihe Vis-à-Vis, Munich, Germany, January 2021.

Genzel, R.: A 40-Year Journey. Invited talk (remote), Congreso Futuro Antofagasta, Universidad Católica del Norte, Chile, January 2021.

Genzel, R.: A 40-Year Journey. Invited talk (remote), Congreso Futuro, Chile, January 2021.

Genzel, R.: A 40-Year Journey. Keynote speech (remote), Telekom Digital Leadership Meeting, Germany, January 2021.

Genzel, R.: Testing General Relativity and the Massive Black Hole Paradigm with Infrared Techniques in the Galactic Center – A 40-Year Journey. Invited talk (remote), International School of Astrophysics Daniel Chalonge - Hector de Vega, Paris, France, February 2021.

Genzel, R.: Presentation of the Jury's Grand Prize. Invited address and discussion (remote), Science Outreach Program for Schools, Nobel Prize Museum, Stockholm, Sweden, February 2021.

- Genzel, R.: A 40-Year Journey. Invited talk and discussion (remote), Oxford German Society, Oxford, UK, February 2021.
- Genzel, R.: Impulse aus der Wissenschaft. Address and discussion, (remote), Interner Wissenschaftspolitischer Austausch der bundesgrünen Fraktions- und Parteispitze, Berlin, Germany, March 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), Colloquium University of Portsmouth, UK, March 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), Colloquium Physics Department University of Athens, Greece, March 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), Colloquium Graduate Program in Physics at Pará University, Brazil, March 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), General Astrophysics Colloquium at Leiden Observatory, Leiden, Netherlands, March 2021.
- Genzel, R.: Discussion on where Physics stands and questions (remote discussion). With Henry Kissinger, Eric Schmidt, Klaus Kleinfeld, David Gross and Brian Schmidt, initiated by Lindau Nobel Laureate Meetings, Lindau, Germany, March 2021.
- Genzel, R.: A Night with the Space Nobelists. Interview (remote) with Finnish Physical Society, the University of Helsinki and Aalto University, Finland, April 2021.
- Genzel, R.: A 40-Year Journey. Hans-Jensen Lecture (remote), Heidelberg University, Germany, April 2021.
- Genzel, R.: About the Nobel Prize and the role of science for policy and decision making. Self-introductory speech and panel discussion (remote), Swedish Parliament, Stockholm, Sweden, April 2021.
- Genzel, R.: A 40-Year Journey. Nobel Lecture (remote), Dutch FYSICA meeting (online), The Netherlands, April 2021.
- Genzel, R.: A 40-Year Journey. Invited talk, Nobel Prize Session (remote), APS April Meeting (online), USA, April 2021.
- Genzel, R.: Eine 40-jährige Reise zum Zentrum der Milchstraße. Invited public talk (remote), Magnus-Haus der DPG, Berlin, Germany, April 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), Byurakan Astrophysical Observatory (BAO), Armenia, May 2021.
- Genzel, R.: A 40-Year Journey: From Theoretical Predictions to Empirical Evidence for a Supermassive Black Hole at the Center of the Milky Way. Invited talk (remote), golden webinar at the Institute of Astrophysics of Pontificia Universidad Católica de Chile (IA-PUC), Santiago, Chile, May 2021.
- Genzel, R.: Speech on the SHAW Prize in Astronomy on behalf of the Committee. (remote, recorded), SHAW Prize 2020 Virtual Award Ceremony, Hong Kong, May 2021.
- Genzel, R. Schwarze Löcher & Galaxien. Invited talk, Frühjahrstagung Orden Pour Le Merit, Berlin, Germany, June 2021.
- Genzel, R. Cosmic Evolution of Star Forming Galactic Disks. Invited talk (remote), Celebration of 50 years of Catherine Cesarsky's career in astronomy, Paris, June 2021.
- Genzel, R.: Galactic Center, A 40-Year Journey. Colloquium, IRAM, Grenoble, France, June 2021.
- Genzel, R.: A 40-Year Journey. Keynote speech (remote), World of Photonics Congress, Munich, Germany, June 2021.
- Genzel, R.: Nobelpreisträger Reinhard Genzel im Gespräch mit Harald Lesch im Rahmen der Festversammlung der 72. Jahresversammlung der Max-Planck-Gesellschaft. Munich, Germany, June 2021.
- Genzel, R.: Karliczek trifft ...Nobelpreisträger Reinhard Genzel. Interview and discussion, BMBF-Festveranstaltung zu den Nobelpreisen in Lindau, Germany, June 2021.
- Genzel, R.: Galaxien und Schwarze Löcher. Public lecture, Lindau Nobel Laureate Meetings, Lindau, Germany, June 2021.
- Genzel, R.: A 40-Year Journey. Invited talk, Lindau Nobel Laureate Meetings, Lindau, Germany, June 2021.
- Genzel, R.: Dark & Black. Panel discussion, Lindau Nobel Laureate Meetings, Lindau, Germany, June 2021.
- Genzel, R.: Panel Lindau Nobel Conference Opening Ceremony. Made in Germany – Research Perspectives for Young Scientists, panel discussion with Bernd Sibler, Anja Karliczek, Lindau Nobel Laureate Meetings, Lindau, Germany, June 2021.
- Genzel, R.: Eine vierzigjährige Reise (zum schwarzen Loch) – Forschen leben und erleben. Address and keynote speech (remote), Virtueller Empfang des Bayerischen Ministerpräsidenten für neuberufene Professorinnen und Professoren, Staatskanzlei, Munich, Germany, June 2021.
- Genzel, R.: A 40-Year Journey. Invited plenary talk (remote), Sixteenth Marcel Grossmann Virtual Meeting - MG16, July 2021.
- Genzel, R.: Vorstellung: Das Max Planck Institut für extraterrestrische Physik. Address and introductory talk, official visit of Stm. Bernd Sibler at Max Planck Institute for Extraterrestrial Physics, Garching, Germany, July 2021.
- Genzel, R.: Testing the massive black hole paradigm with high-resolution astronomy. Invited talk (remote), Game Changer Seminars, ISSI Bern, Switzerland, July 2021.
- Genzel, R.: A 40-Year Journey. Invited talk (remote), University of Arizona/ Center for Consciousness Studies, Science & Roger Penrose: On the Occasion of his 90th birthday and Nobel Prize, Online Event, USA, August 2021.
- Genzel, R.: A 40-Year Journey – General relativity and supermassive black holes. Invited talk (remote), 42nd edition of the Meeting for the Friendship of Peoples, Rimini, Italy, August 2021.

Genzel, R.: Galaxien und Schwarze Löcher. Invited talk (remote), DPG Frühjahrstagung, Jena, Germany, August 2021.

Genzel, R.: A 40-Year Journey. Invited talk (remote), XL Meeting of the Polish Astronomical Society, Szczecin, Poland, September 2021.

Genzel, R.: Eine 40-jährige Reise zum Zentrum der Milchstraße. Invited public talk (remote), Zooming into the Universe, Tagung der Astronomischen Gesellschaft 2021 (online), Germany, September 2021.

Genzel, R.: Galaxies and Massive Black Holes. Invited talk (remote) for the virtual seminar series: Precision Physics and Fundamental Symmetries, Germany/ Switzerland, September 2021.

Genzel, R.: Eine 40-jährige Reise zum Zentrum der Milchstraße. Invited talk (remote), Jean-Hanley-Memorial Lecture, Hauptstadtkongress der DGAI (online), Germany, September 2021.

Genzel, R.: Eine 40-jährige Reise Invited talk, Treffen der Jugend forscht Landessiegerinnen und -sieger im Fachgebiet Physik, ausgerichtet vom Max-Planck-Institut für extraterrestrische Physik (online), Germany, September 2021.

Genzel, R.: Eine 40-jährige Reise. Invited talk, Der Bundeswirtschaftssenat im Dialog, Munich, Germany, September 2021.

Genzel, R.: A 40-Year Journey: Testing General Relativity & The Massive Black Hole Paradigm at the Center of the Milky Way. Invited plenary talk (remote), International Online Conference "Black Holes Inside and Out, USA/ Japan, September 2021.

Genzel, R.: A 40-Year Journey: Testing General Relativity & The Massive Black Hole Paradigm at the Center of the Milky Way. Invited talk (remote), ESO Event celebrating the Nobel Prize of Physics 2020 (online), Chile, September 2021.

Genzel, R.: A 40-Year Journey. Invited talk (remote), Photonics Days 2021, Jena, September 2021.

Genzel, R.: 40-Year Journey. Invited talk (remote), IAP Colloquium (séminaire de l'Institut d'Astrophysique de Paris), Paris, France, October 2021.

Genzel, R.: Vorstellung: Das Max-Planck-Institut für extraterrestrische Physik. Address and introductory talk, official visit of Dr. Heubisch and delegation from Bayerischer Landtag at Max Planck Institute for Extraterrestrial Physics, Garching, Germany, October 2021.

Genzel, R.: Galaxien und Schwarze Löcher. Invited talk, Mitgliederversammlung der Heisenberg-Gesellschaft, Munich, Germany, Oktober 2021.

Genzel, R.: Speech on the SHAW Prize in Astronomy on behalf of the Committee (remote, recorded). SHAW Prize 2021 Virtual Award Ceremony, Hong Kong, October 2021.

Genzel, R.: A 40-Year Journey. Invited talk (recorded), 4th World Laureates Forum "Open Science" (online), Shanghai, China, October 2021.

Genzel, R.: Black Holes: From Theoretical Speculation to Fundamental Physics Laboratories. Invited talk (remote), Astrophysics Roundtable, University of California, Berkeley, USA, November 2021.

Genzel, R.: Verstehen, was nicht zu verstehen ist: Ein Blick auf Metawissen und die Bedeutung von schwarzen Löchern – Prof. Dr. Reinhard Genzel und Prof. Rolf Rodenstock im Gespräch. Invited discussion (recorded), RHI-Fachsymposium (online), Munich, November 2021.

Genzel, R.: A 40-Year Journey. Invited talk (recorded TED talk), 2021 WE Summit, Beijing, China, 2021.

Genzel, R.: A 40-Year Journey. Invited talk (remote), II NAT Lectures on Astrophysics, Universidade Cidade de São Paulo (UNICID), Brazil, November 2021.

Genzel, R.: State of the MPE-IR Group's research and projects. MPE-IR Group Retreat, Ringberg Castle, Germany, December 2021.

Genzel, R.: Future questions in black hole and galactic nuclei research. MPE-IR Group Retreat, Ringberg Castle, Germany, December 2021.

Gillessen, S.: The Galactic Center Black Hole. Invited Talk, Regensburg, Germany, February 2021.

Gillessen, S.: Kepler, Einstein und das Schwarze Loch im Zentrum der Milchstraße. Public Talk, Deutsches Museum, Munich, Germany, February 2021.

Gillessen, S.: Einstein im Test – Das Schwarze Loch im Zentrum der Milchstraße. Invited Talk, Physik-Olympiade, virtual, Germany, February 2021.

Gillessen, S.: Schwarze Löcher - Science Fiction oder Realität?. Public Talk, Junior-Uni, Wuppertal, Germany, March 2021.

Gillessen, S.: Das Schwarze Loch im Zentrum der Milchstraße. Invited Talk, RoundTable, Heilbronn, Germany, November 2021.

Gillessen, S.: Das Schwarze Loch im Zentrum der Milchstraße. Public Talk, Justinus-Kerner-Gymnasium, Heilbronn, Germany, November 2021.

Gillessen, S.: Schwarze Löcher - Science Fiction oder Realität?. Public Talk, Schulvortrag, Cuxhaven, Germany, November 2021.

Gillessen, S.: Das Schwarze Loch im Zentrum der Milchstraße. Public Talk, Auricher Wissenschaftstage, Aurich, Germany, November 2021.

Grupp, F.: The role of standardization in the development of next generation of large telescopes. Invited Talk, UV/ Optical/IR Space Telescopes and Instruments: Innovative Technologies and Concepts-X, August 2021.

Haerendel, G.: New Insights into the Onset of a Substorm. Colloquium, Space Physics Seminar Series / Rice University / Zoom, Houston, USA, April 2021.

Halder, A.: The integrated 3-point shear correlation function. Contributed Talk, Cambridge LMU Workshop, remote, January 2021.

- Halder, A.: The integrated 3-point shear correlation function. Colloquium, Density Splits Statistics Group Seminar, Stanford University, March 2021.
- Halder, A.: The integrated 3-point shear correlation function. Invited Talk, Dark Energy Survey Collaboration Meeting, May 2021. Boston, USA, April 2021.
- Hu, C.-Y.: Metallicity dependence of the H/H<sub>2</sub> and C+/C/CO distributions in a resolved self-regulating interstellar medium. Cologne ISM group meeting, virtual, May 2021.
- Hu, C.-Y.: Metallicity dependence of the X\_CO factor in a multiphase interstellar medium. IAU Symposium „The predictive power of computational astrophysics“, virtual, November 2021.
- Hu, C.-Y.: Metallicity dependence of the H/H<sub>2</sub> and C+/C/CO distributions in a resolved self-regulating interstellar medium. ISM 2021 conference, virtual, May 2021.
- Hu, C.-Y.: Metallicity dependence of the H/H<sub>2</sub> and C+/C/CO distributions in a resolved self-regulating interstellar medium. MPA cosmology seminar, virtual, March 2021
- Hu, C.-Y.: The dependence of XCO on metallicity, intensity, and spatial scales. CCA galaxy group meeting, virtual, October 2021.
- Jiménez-Redondo, M.: Study of low-temperature ion-neutral interactions in a 22-pole ion trap. Contributed Talk, Laboratory Astrophysics Workshop 2021, Dornburg, Germany, November 2021.
- Kravchenko, K.: Tomography of evolved star atmospheres. Invited Talk, The Death-throes of Evolved stars, a Virtual Encounter, Leuven, Belgium, April 2021.
- Kravchenko, K.: The Great Dimming of Betelgeuse revealed by tomography. Contributed Talk, EAS 2021, virtual meeting, June 2021.
- Kravchenko, K.: MICADO: Instrument overview and cold tests. Contributed Talk, (The Network of Young Researchers in Instrumentation for Astronomy virtual workshop, October 2021.
- Kruk, S.: Galaxy morphology in the era of large surveys. Invited Talk, Modern statistics of Galaxies Series, LMU and USM, Munich, Germany, November 2021.
- Lee, M.: Cold gas in high redshift galaxies. Invited Talk, Seoul National University Colloquium, Seoul, South Korea, June 2021.
- Lee, M.: Gas mass calibration in a z=2.5 protocluster, Galaxy Cluster Formation II (GCF2021). Contributed Talk, Virtual meeting, June 2021.
- Lee, M.: Galaxy evolution in different environments at cosmic noon, DAWN summit 2021. Contributed Talk, Copenhagen and zoom, Denmark/online, September 2021.
- Lee, M.: Earth, Solar system and the Universe (in Korean). Public Talk, Saarbrücken, Germany, May 2021.
- Liu, T.: The eROSITA Final Equatorial Depth Survey (eFEDS): X-ray catalog and AGN spectra. Contributed Talk, 2021 INTEGRAL conference, Pula, Italy, October 2021.
- Malyali, A.: Early results from eROSITA's search for Tidal Disruption Events. Contributed Talk, AAS 237, Virtual, January 2021.
- Malyali, A.: AT 2019avd: a novel addition to the diverse population of nuclear transients. Contributed Talk, eROSITA consortium meeting, Virtual, January 2021.
- Meidinger, N.: eROSITA Detector Development for X-ray Astronomy. Colloquium, Forum Munich Aerospace, Garching, Germany, May 2021.
- Merloni, A.: New eyes on the X-ray sky: First Results from eROSITA on SRG. Colloquium, ASI, Rome, Italy, January 2021.
- Merloni, A.: New eyes on the X-ray sky: First Results from eROSITA on SRG. Colloquium, DESY, Hamburg, Germany, February 2021.
- Merloni, A.: New eyes on the X-ray sky: First Results from eROSITA on SRG. Colloquium, Astroparticle and Cosmology Lab, Paris, France, February 2021.
- Merloni, A.: New eyes on the X-ray sky: First Results from eROSITA on SRG. Colloquium, Space Telescope Science Institute, Baltimore, USA, March 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, ASTRON, Dwingeloo, The Netherlands, April 2021.
- Merloni, A.: eROSITA on SRG: Mission Status and AGN surveys first results. Invited Talk, American Physical Society April Meeting, Remote, USA, April 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, University of Groningen, Groningen, The Netherlands, May 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, FAU, Erlangen, Germany, May 2021.
- Merloni, A.: Galaxy Clusters and AGN with SRG/eROSITA. Invited Talk, EAS Meeting, S3, Leiden, The Netherlands, June 2021.
- Merloni, A.: The X-ray variability of galactic nuclei as probed by SRG/eROSITA. Invited Talk, EAS Meeting, SS18, Leiden, The Netherlands, June 2021.
- Merloni, A.: eROSITA on SRG: early science highlights and transients. Invited Talk, ULTRASAT Workshop, Tel Aviv, Israel, October 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, ISSI 'Game Changers' Series, Bern, Switzerland, October 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, Stockholm University, Stockholm, Sweden, November 2021.
- Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, IRAP,

Toulouse, France, November 2021.

Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, Beijing University, Beijing, China, November 2021.

Merloni, A.: Of Bubbles, Filaments, Echoes and Eruptions: First results from eROSITA on SRG. Colloquium, University of Bologna, Bologna, Italy, November 2021.

Merloni, A.: Status of the SRG/eROSITA telescope and scientific results of the German consortium. Invited Talk, IKI High-Energy Astrophysics Conference, Moscow, Russia, December 2021.

Merloni, A.: Introducing eROSITA on SRG. Invited Talk, EAS 2021 (Press Conference dedicated to eROSITA EDR), Leiden, The Netherlands, June 2021.

Müller, T.: Revisiting Ryugu's pre-/post-mission thermal observations: emissivity determination. Contributed Talk, Europlanet Science Congress 2021, Virtual, September 2021.

Müller, T.: Interpretation of Short-Wavelength Thermal Observations: The Case of Ryugu. Contributed Talk, Rock, Dust and Ice: Interpreting planetary data, Virtual, March 2021.

Müller, M. B.: Ice, Ice, Baby - Chemie im All und die Geburt von Sternen. Invited Talk, Talk for the JungChemikerForum of the University Würzburg, Würzburg (virtual), Germany, April 2021.

Müller-Seidlitz, J.: Silicon Detectors for Future X-Ray Astrophysics. Invited Talk, Silicon Sensors for Precision Radiation Detection and Quantum Applications, MPI Semiconductor Laboratory, Virtual Symposium, Munich, Germany, September 2021.

Parikh, T.: Stellar Population Analysis: A Sample of MUSE Galaxies. Invited Talk, Galaxy Breakfast Meeting, remote, Institute of Cosmology and Gravitation, University of Portsmouth, UK, February 2021.

Parikh, T.: Probing the IMF using a sample of MUSE Galaxies: Stellar Population and Dynamical Constraints. Contributed Talk, EAS 2021, Leiden, Netherlands, June 2021.

Pezzotta, A.: Testing one-loop galaxy bias. Invited Talk, Cosmology Seminar, Lorentz Institute for theoretical physics, Leiden University, Leiden, Netherlands, November 2021.

Pineda, J.: The role of Streamers on star and disk formation: mirage or reality?. Invited Talk, Ringberg: Puzzles of Star Formation, Kreuth, Germany, July 2021.

Predehl, P.: eROSITA on SRG The new X-ray All-sky Survey. Invited Talk, Theseus 2020 Conference, Malaga (Zoom), Spain, March 2021.

Predehl, P.: X-ray Instrumentation to observe the Universe. Invited Talk, High Precision X-ray Measurement 2021, Frascati (Zoom), Italy, June 2021.

Predehl, P.: The hot and energetic Universe and the X-ray Telescope eROSITA. Colloquium, MPI für Kernphysik, Heidelberg (Zoom), Germany, July 2021.

Predehl, P.: eROSITA und das heiße Universum. Public Talk, Planetarium Hamburg, Hamburg, Germany, November 2021.

Predehl, P.: eROSITA und das heiße Universum. Public Talk, Sternfreunde Nordenham, Nordenham, Germany, October 2021.

Predehl, P.: eROSITA und das heiße Universum. Public Talk, Olbers-Gesellschaft, Bremen, Germany, October 2021.

Predehl, P.: eROSITA - Eine neue Himmelsdurchmusterung im Röntgenlicht. Public Talk, Museum für Naturkunde, Münster, Germany, October 2021.

Price, S.: Probing the structure and dynamics of distant massive star-forming galaxies with MICADO and HARMONI: From galaxy to clump scales. Contributed Talk, Spatially Resolved Spectroscopy with Extremely Large Telescopes, Oxford (virtual), UK, Sept 2021.

Pulsoni, C.: The outer reaches of galaxies: structure, kinematics, and accretion history. Invited Talk, EAS 2021, Leiden, Netherlands, June 2021.

Pulsoni, C.: The stellar halos of ETGs in the IllustrisTNG simulations. Invited Talk, EAS 2021, Leiden, Netherlands, June 2021.

Pulsoni, C.: The stellar halos of massive ETGs. Contributed Talk, RU-D Science Day of the ORIGINS Excellence Cluster, Garching, Germany, September 2021.

Pulsoni, C.: The stellar halos of ETGs in the IllustrisTNG simulations. Colloquium, Galaxy Evolution Seminar, Oxford, UK, February 2021.

Pulsoni, C.: The stellar halos of ETGs in the IllustrisTNG simulations. Colloquium, OPINAS Seminar, Garching, Germany, February 2021.

Pulsoni, C.: The structure of stellar halos in early type galaxies. Colloquium, MPE institute seminar, Garching, Germany, December 2021.

Rab, Ch.: Constraining the energetic particle flux of young stars during the period of planet formation.. Contributed Talk, Virtual Meeting of the German Astronomical Society - Zooming into the Universe, Online, Germany, September 2021.

Rab, Ch.: Detecting PAHs in exoplanets and planet-forming disks with Twinkle. Contributed Talk, Twinkle and the Next Generation of Exoplanet Scientists, Online, Online, September 2021.

Rab, Ch.: Constraining the energetic particle flux of young stars during the period of planet formation. Contributed Talk, AGU Fall-Meeting - Session: Cool Stars and Their Influence on (Exo)Planetary Habitability, Online, United States, December 2021.

Ramos-Ceja, M. E.: Mapping large scale structures at high energies: initial results from eROSITA on SRG. Colloquium, GreatWestern Seminar Series, Bristol, Bath & Cardiff, United Kingdom, February 2021.

- Ramos-Ceja, M. E.: Mapping large scale structures at high energies: initial results from eROSITA on SRG. Colloquium, Chalmers Astrophysics Colloquium, Online, Sweden, May 2021.
- Ramos-Ceja, M. E.: Comparison of X-ray detected and shear-selected galaxy cluster samples in the eFEDS area. Contributed Talk, European Astronomical Society Annual Meeting, Online, Netherlands, June 2021.
- Ramos-Ceja, M. E.: Mapping large scale structures in X-rays: eROSITA in SRG. Invited Talk, Cosmology from Home, Online, Germany, June 2021.
- Ramos-Ceja, M. E.: El Universo en rayos X (in Spanish). Public Talk, Festival de la Familia Marista, Online, Mexico, May 2021.
- Ramos-Ceja, M. E.: El Universo visto en rayos X (in Spanish). Public Talk, Centro Escolar Juana de Asbaje, Zamora, Mexico, December 2021.
- Ramos-Ceja, M. E.: eROSITA-DE Early Data Release (EDR). Invited Talk, EAS 2021 (Press conference dedicated to the eROSITA EDR), Virtual, June 2021.
- Rau, A.: Surveys for Transients - Athena/VRO Synergies. Invited Talk, Rubin-Athena Synergy Workshop, remote, April 2021.
- Rau, A.: Athena/WFI Update. Invited Talk, Athena X-IFU Consortium Meeting #13, remote, May 2021.
- Rau, A.: Tidal Disruption Events - An Overview of eROSITA-DE Findings in eRASS1-3. Contributed Talk, eROSITA Consortium Meeting, remote, June 2021.
- Rau, A.: SRG/eROSITA. Invited Talk, Swift Senior Review Strategy Workshop, remote, November 2021.
- Rau, A.: Athena/WFI Update. Invited Talk, Athena/X-IFU Consortium Meeting #14, remote, November 2021.
- Redaelli, E.: The cosmic-ray ionisation rate in the prestellar core L1544. Invited Talk, Annual meeting of the german astronomical society, Online, Germany, September 2021.
- Redaelli, E.: Identification of prestellar cores in high-mass clumps with ALMA  $\text{o-H}_2\text{D}^+$  observations. Contributed Talk, Astrochemical Frontiers - quarantine edition 2.0, Online, Germany, July 2021.
- Redaelli, E.: Molecular fractionation in low-mass star forming regions. Contributed Talk, EAS annual meeting, Online, Germany, July 2021.
- Redaelli, E.: Molecular fractionation in star forming regions. Colloquium, Laura Bassi series - INAF, Online - Padova, Italy, June 2021.
- Salvato, M.: An update on eROSITA. Invited Talk, Accretion History of AGN (AHA) workshop, Virtual, USA, January 2021.
- Salvato, M.: eROSITA contribution to AGN studies. Colloquium, Leibniz Institute Astrophysics (former AIP), Potsdam, Germany, February 2021.
- Salvato, M.: Identification of counterparts to X-ray sources using Machine Learning (but not only). Invited Talk, Chandra data science workshop, Virtual, USA, August 2021.
- Salvato, M.: The eROSITA Final Equatorial-Depth Survey (eFEDS): an unprecedented test bench for AGN studies. Contributed Talk, EAS2021, Virtual, June/July 2021.
- Salvato, M.: The eROSITA Final Equatorial-Depth Survey (eFEDS). Contributed Talk, Supermassive Black Hole Studies with the Legacy Survey of Space and Time 2021, Virtual, July 2021.
- Salvato, M.: Active Galactic Nuclei and the 7 X-ray eyes of eROSITA. Colloquium, St. Andrew University, St. Andrew, UK, November 2021.
- Salvato, M.: Synergies between eROSITA and other observatories. Invited Talk, EAS2021 (Press Conference dedicated to the eROSITA EDR), Virtual, Virtual, June/ July 2021.
- Sanchez, A.: The correct interpretation of RSD measurements. Invited Talk, Cambridge-LMU cosmology workshop, remote, January 2021.
- Sanchez, A.: Let us bury the prehistoric h: arguments against using Mpc/h. Invited Talk, 16th Marcel Grossmann meeting, remote, July 2021.
- Sanchez, A.: Evolution mapping: a new approach to describe non-linear. Colloquium, Cosmology Seminar, MPA Garching, remote, September 2021.
- Sanchez, A.: Evolution mapping: a new approach to describe non-linear. Invited Talk, Modern statistics of cosmic structure series, USM, Munich, October 2021.
- Sanders, J.: New results on galaxy clusters from the eROSITA early data release. Colloquium, Institute of Astronomy, Cambridge (Virtual), UK, June 2021.
- Segura-Cox, D.: Starting Early: Embedded Disks Jumpstart Planet Formation. Colloquium, University of Illinois Department of Astronomy, Urbana, USA, March 2021.
- Segura-Cox, D.: A ringed Class I dust disk accretes envelope material via an accretion streamer. Contributed Talk, From Core to Disk 2, Orsay, France, May 2021.
- Segura-Cox, D.: Starting Sooner: Streamers could Jumpstart Planet Formation in Embedded Disks. Invited Talk, European Astronomical Society (EAS) Annual Meeting 2021, Leiden, Netherlands, June 2021.
- Seppi, R.: The mass function dependence on the dynamical state of dark matter haloes. Contributed Talk, A multi-wavelength view of galaxy clusters: deriving masses in the era of wide-field surveys, Virtual, September 2021.
- Seppi, R.: The mass function dependence on the dynamical state of dark matter haloes. Contributed Talk, UK NAM 2021, University of Bath, UK, virtual, July 2021.
- Shangguan, J.: GRAVITY results on Active Galactic Nuclei. Colloquium, Virtual Seminar at University of Hertfordshire, Hertfordshire, UK, Virtual Meeting, January 2021.

- Shangguan, J.: Probing the active supermassive black hole with VLTI/GRAVITY. Contributed Talk, AG2021, Virtual Meeting, September 2021.
- Shangguan, J.: Resolving the Active Galactic Nuclei with VLTI/GRAVITY. Contributed Talk, EAS2021, Leiden, Netherlands, Virtual Meeting, June 2021.
- Shangguan, J.: Science of VLTI/GRAVITY near-infrared interferometer and the studies of luminous AGNs. Colloquium, British Columbia Galaxy Summer Semi-nars, Virtual Meeting, June 2021.
- Shimizu, T.: Probing AGN and Feedback with VLTI/ GRAVITY. Contributed Talk, EAS 2021, Leiden, virtual, June 2021.
- Shimizu, T.: GRAVITY+: A Cosmic Evolution Explorer. Invited Talk, EAS 2021, Leiden, virtual, June 2021.
- Shimizu, T.: GRAVITY+: A Cosmic Evolution Explorer. Invited Talk, GRAVITY+ Community Workshop, Garching, virtual, February 2021.
- Shimizu, T.: Resolving the Sub-parsec Structure of AGN with VLTI/GRAVITY. Colloquium, International AGN Seminar Series, Washington D.C., U.S.A., June 2021.
- Sipilä, O.: A Revised Description of the Cosmic Ray- Induced Desorption of Interstellar Ices. Contributed Talk, EAS21 SS15: Molecules in starless and pre-stellar cores, online, July 2021.
- Sipilä, O.: A Revised Description of the Cosmic Ray- Induced Desorption of Interstellar Ices. Contributed Talk, Astrochemical Frontiers 2021, online, July 2021.
- Spezzano, S.: Chemical complexity at the dawn of star formation. Colloquium, Institute Seminar, Heraklion, Crete, March 2021.
- Spezzano, S.: Methanol GEMS: An extensive study on methanol towards starless cores in the Taurus Molecular Cloud. Contributed Talk, Astrochemical Frontiers, online, July 2021.
- Spezzano, S.: H<sub>2</sub>CS deuteration maps towards the pre-stellar core L1544. Contributed Talk, SOFIA workshop, online, June 2021.
- Stadler, J.: Imaging @ GRAVITY. Invited Talk, ESO VLTI image reconstruction coordination meeting, Garching, Germany, April 2021.
- Straub, O.: GR with GRAVITY: latest news from the Galactic Centre. Invited Talk, The 11th "Accretion disk and relativistic astrophysics" meeting, Bremen, Germany, June 2021.
- Straub, O.: GRAVITY: General Relativity in the Galactic Centre. Invited Talk, Hertfordshire, UK, June 2021.
- Straub, O.: GRAVITY: Optical/IR Interferometry and General Relativity in the Galactic Centre. Invited Talk, 16th Marcel Grossmann Meeting, Rome, Italy, July 2021.
- Subramanian, S.: INODE for Astrophysics: SDSS Database. Invited Talk, International INODE EOSC Workshop 2021, remote, may 2021.
- Tacconi, L. J.: The Evolution of the Star Forming Interstellar Medium Across Cosmic Time. Colloquium, Paris (remote via zoom), France, November 2021.
- Tacconi, L. J.: European Leadership in Space Science. Invited Talk, Meeting of the Expert Group on the Future of Space in Europe, Frascati, Italy, July 2021.
- Tacconi, L. J.: Voyage 2050 Recommendations. Invited Talk, ESA Science Programme Committee Meeting, Virtual meeting, Virtual meeting, June 2021.
- Tacconi, L. J.: The Evolution of the Star Forming Interstellar Medium Across Cosmic Time. Colloquium, Hebrew University, Jerusalem (virtual presentation), Isra-el, May 2021.
- Tacconi, L. J.: The Evolution of the Star Forming Interstellar Medium Across Cosmic Time. Colloquium, Munich Joint Astronomy Colloquium, Garching, Germany, January 2021.
- Übler, H.: Nobelpreis für Physik 2020. Public Talk, Nobelpreis-Matinee 2021, Lindau, Germany, January 2021.
- Valdivia Mena, M. T.: River in the sky: a streamer feeding a Class I protostar. Contributed Talk, European Astronomical Society Annual Meeting, Leiden, The Netherlands, June 2021.
- Valdivia Mena, M. T.: A Class I protostar with a high streamer mass infall rate. Contributed Talk, Gaps, Rings, Spirals, and Vortices: Structure Formation in Planet-Forming Disks / Miapp Conference, Garching, Germany, October 2021.
- van Dishoeck, E.: Our Origins in Space. Public Talk, Late night conference series, Nijmegen, Netherlands, January 2021.
- van Dishoeck, E.: Our Origins in Space. Invited Talk, Prix Jules Janssen lecture, Societe astronomique de France, Paris, France, January 2021.
- van Dishoeck, E.: Our Origins in Space. Invited Talk, Origins conference, Groningen, Netherlands, January 2021.
- van Dishoeck, E.: Our Origins in Space. Public Talk, European Network of Science Centres and Museums (Ecsite) annual conference, Brussels, Belgium, June 2021.
- van Dishoeck, E.: Zooming into planet-forming zones of disks with ALMA. Colloquium, Golden Jubilee talk, Indian Institute of Astrophysics, Bangalore (virtual), India, March 2021.
- van Dishoeck, E.: Zooming into planet-forming zones of disks with ALMA. Colloquium, Physics Dept., Drexel University, Philadelphia (virtual), USA, February 2021.
- van Dishoeck, E.: Zooming into planet-forming zones of disks with ALMA. Colloquium, Astronomy Dept., Tel Aviv University, Tel Aviv (virtual), Israel, February 2021.
- van Dishoeck, E.: Zooming into planet-forming zones of disks with ALMA. Colloquium, Astronomy Dept., Yale University, New Haven (virtual), USA, October 2021.



- van Dishoeck, E.: Astrochemistry of diffuse and dense gas: some basics and recent results. Invited Talk, ISM2021 meeting, Beirut (virtual), Lebanon, May 2021.
- van Dishoeck, E.: Astrochemistry and the formation of planetary systems. Invited Talk, Symposium in honor of Catherine Cesarsky, Paris (virtual), France, June 2021.
- van Dishoeck, E.: The journey of water and complex molecules from clouds to planets. Public Talk, Golden Webinar seminar, Santiago (virtual), Chile, July 2021.
- van Dishoeck, E.: Molecular processes in UHV between the stars. Invited Talk, 2nd Faraday Joint Interest Group meeting on Astrochemistry, Sheffield (virtual), UK, March 2021.
- van Dishoeck, E.: Molecular processes in UHV between the stars. Invited Talk, American Vacuum Society meeting, Charlotte (virtual), USA, October 2021.
- van Dishoeck, E.: Observing simple and complex molecules in space. Invited Talk, Intercat meeting, Sandbjerg, Denmark, September 2021.
- van Dishoeck, E.: Deciphering protoplanetary disks: step by step. Invited Talk, Perspective talk, MIAPP meeting on Structure Formation in Planet-forming Disks, Garching, Germany, October 2021.
- van Dishoeck, E.: Building stars, planets and the ingredients for life in space. Invited Talk, Kylafis Prize lecture, University of Crete, Heraklion, Greece, October 2021.
- van Dishoeck, E.: Synergies and challenges of ground and space astronomy. Invited Talk, ISSI Forum meeting, Bern, Switzerland, November 2021.
- van Dishoeck, E.: Nieuwe Werelden, nieuwe perspectieven. Public Talk, Annual lecture, Koninklijke Nederlandsche Maatschappij der Wetenschappen, Haarlem (virtual), Netherlands, May 2021.
- van Dishoeck, E.: things we have never seen: the James Webb Space Telescope explores the cosmos. Public Talk, World Science Festival forum, New York (virtual), USA, December 2021.
- van Dishoeck, E.: JWST: een nieuwe ontdekkingsreis. Public Talk, Omniversum Planetarium, The Hague, Netherlands, November 2021.
- van Dishoeck, E.: Building stars, planets and the ingredients for life in space. Public Talk, Arago Lustrum symposium, Enschede, Netherlands, May 2021.
- van Dishoeck, E.: Building stars, planets and the ingredients for life in space. Public Talk, Descartes College, Utrecht, Netherlands, November 2021.
- van Dishoeck, E.: Life, the Universe and Everything!. Public Talk, Studium Generale, Eindhoven, Netherlands, September 2021.
- van Dishoeck, E.: Where does the water on Earth come from?. Public Talk, Public talk, Beirut (virtual), Lebanon, May 2021.
- van Dishoeck, E.: The IAU Today. Invited Talk, Historical, Cultural and Scientific Heritage of Astromical Observatories, Kazan (virtual), Russia, April 2021.
- van Dishoeck, E.: IAU100: Hundred years under one Sky. Public Talk, Communicating Astronomy to the Public Conference, Paris (virtual), France, May 2021.
- van Dishoeck, E.: Women in Astronomy and the IAU. Public Talk, University of Crete, Heraklion, Greece, October 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Colloquium, LSST Cluster cosmology working group, April 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Colloquium, MPE OPINAS Seminar, MPE Garching, March 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Colloquium, Excellence Cluster ORIGINS RU-C Science Day, February 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Colloquium, Cambridge-LMU Collaboration Meeting, January 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Contributed Talk, LSST-DESC Cluster working group telecon in-kind contribution update 2021, September 2021.
- Varga, T.: Synthetic Galaxy Clusters and Images from DES Y3. Contributed Talk, LSST-DESC CSS working group telecon in-kind contribution update 2021, October 2021.
- Varga, T.: Update on DES Y3 Cluster weak lensing measurement pipeline. Colloquium, DES Cluster working group, February 2021.
- Varga, T.: Project pitch: Weak lensing mass feature importance analysis for DES Y3 Galaxy clusters. Colloquium, DES Cluster working group, March 2021.
- Varga, T.: Update on Weak lensing mass feature importance analysis for DES Y3 galaxy clusters. Colloquium, DES Cluster working group, July 2021.
- Varga, T.: Update on Weak lensing mass feature importance analysis for DES Y3 galaxy clusters. Colloquium, DES Cluster working group, November 2021.
- von Kienlin, A.: Das hochenergetische Universum. Public Talk, Fortbildungsveranstaltung „Fachschaftsleitungsstagung Physik“, R L F B Mittelfranken, Nürnberg, Germany, October 2021.
- von Kienlin, A.: A Decade of Gamma-ray Bursts Observed by Fermi-GBM. Contributed Talk, Ninth International Fermi Symposium, Virtual Conference, Germany, April 2021.
- Widmann, F.: The GRAVITY instrument and its science results. Invited Talk, VLTI Summer School, online, June 2021.
- Wylie, S.M. Abundance maps of the Milky Way's b/p bulge and long bar using the combined A2A and APOGEE surveys. Colloquium, Workshop Heidelberg, Heidelberg, 2021

## PhD Theses

Arcodia, R.: Accretion onto black holes across the mass scale. Ludwig Maximilian University, 2021.

Ider Chitham, J. (2021). Galaxy cluster identification with eRosita in the era of big data. PhD Thesis, Ludwig Maximilians Universität München, München, Germany.

Kaltenbrunner, D.: A comprehensive Study of Molecular Gas near Active Galactic Nuclei. MPE, 2021.

Lippich, M.: On unbiased and higher-order large-scale structure statistics: Covariance Matrices and Minkowski Functionals. Max-Planck-Institute for Extraterrestrial Physics, 2021.

Malyali, A.: The transient X-ray sky of eROSITA: from prediction, through observation, to interpretation. Max Planck Institute for Extraterrestrial Physics, 2021.

Pulsoni, C.: Stellar halos of massive galaxies: morphology, kinematics, and cosmological origin. Ludwig-Maximilians-Universität München, 2021.

von Fellenberg, S.: Probing the accretion physics of Sgr A\*. MPE, 2022.

## Master Theses

Blumhoff, M.: 2D stellar kinematics of (barred) disk galaxies. LMU, 2021.

Bolzer, M.-L.: Upgrading a VLTI beam compressor into a differential delay line. Max Planck Institute for Extraterrestrial Physics, 2021.

Drescher, A.: First Observations with GRAVITY Wide. Max Planck Institute for Extraterrestrial Physics, 2021.

Giers, Katharina: Deuteration of  $c\text{-C}_3\text{H}_2$  towards the pre-stellar core L1544. MPE, 2021.

Gonzales, J.: Stacking the Spectra of eROSITA Galaxy Cluster Data for Searches of the 3.5keV line: Dark Matter Decay or Charge Exchange?. MPE/LMU, 12.2021.

Grau, Marco: The eROSITA Final Equatorial-Depth Survey (eFEDS): optical spectroscopy of the counterparts to the point-like sources. MPE, 2021.

Haase, M.: Control Electronics Development for GRAVITY+ Wavefront Sensors. TU München, 2021.

Kaltenbrunner, D.: A comprehensive Study of Molecular Gas near Active Galactic Nuclei. Max-Planck-Institut für extraterrestrische Physik, 2021.

Ozsoy, Y.: Finding Superclusters with eROSITA. MPE/LMU, 10.2021.

Scheck, D.: Mass Profiles of Galaxy Clusters in the eROSITA Survey. Technical University of Munich, 2021.

Wimmer, L.: Investigation of Collective Complex Plasma Phenomena with PK-4. Max Planck Institute for Extraterrestrial Physics, 2021.

Young, A.: Determining stellar accelerations in the regime of the clockwise disk in the Galactic Center. Institut für Extraterrestrial Physics, 2021.

## Bachelor Theses

Ecker, L.: The mass of the supermassive black hole of the BCGs of Abell 498/592. Albert-Ludwig Universität Freiburg, 2021.

Haubold, T.: Atmosphärenphysik von Exoplaneten. LMU, 2021.

Loebbecke, M.: Massenbestimmung von supermassiven schwarzen Löchern und Korrelationen. LMU, 2021.

Perez de Lema Ezcurra, M.: Supermassereiche schwarze Löcher in aktivn Galaxienkernen und ihre Charakterisierung mittels  $\text{H}_2\text{O}$ -Maser Emissionen. LMU, 2021.

Wiertel, M.: Massenbestimmung supermassiver schwarzen Löcher. Karlsruher Institut für Technologie, 2021.

Yasar, D.: Phaenomene bei Naehrung von Sternen an supermassive schwarze Löcher. LMU, 2021.

# Collaborations / Transfer of Know-How

## Scientific Collaborations by Country



### Austria

Institut für Weltraumforschung, Graz: ATHENA WFI.  
 Universität und TU Wien: MICADO; ATHENA.  
 Universität Innsbruck: MICADO.  
 Universität Linz: MICADO.  
 RICAM Linz: MICADO.

### Belgium

Katholieke Universiteit Leuven, Leuven: GRAVITY+.

### Brazil

Universidade Federal de Minas Gerais, Belo Horizonte: CAS-Observations.

### Canada

University of Toronto, Toronto: CAS-Theory.

### Chile

ESO, Joint ALMA Observatory, Santiago de Chile: CAS-Observations; SBNF.

Universidad de Chile, Santiago de Chile: CAS-Observations.

Universidad de Concepcion: Max-Planck-Partnergruppe Baryonischer Zyklus in Galaxien; Röntgen-Doppelsternsysteme; CAS-Observations; Galaxienentwicklung.

Universidad Catolica Santiago, Santiago de Chile: Röntgen-Doppelsternsysteme; Max-Planck-Partnergruppe Galaktisches Zentrum.

Universidad Diego Portales, Santiago de Chile: CAS-Observations.

### China

Donghua University, Shanghai: CAS-Theory.

Institute for High-Energy Physics (IHEP), Peking: Gammaquellen mit COMPTEL und INTEGRAL; Einstein Probe; eXTP.

Nanjing University, Nanjing: CAS-Observations.

National Astronomical Observatories of China, Peking: PFS; CAS-Observations, CAS-Theory.

Kavli Institute for Astronomy and Astrophysics at Peking University, Peking: PFS.

Shanghai Jiao Tong University, Shanghai: PFS.

Tsinghua University, Peking: PFS.

University of Hongkong, Hongkong: Strahlungsmechanismen von Pulsaren im Röntgen- und Gammabereich.

University of Science and Technology of China, Hefei: PFS.

Xiamen University, Xiamen: PFS.

Xinjiang Astronomical Observatory, Ürümqi: CAS-Theory.

### Czech Republic

Charles University, Prague: SBNF; Hayabusa-2.

### Denmark

Dänemarks Technische Universität, Lyngby: ATHENA.

Niels Bohr Institute, University of Copenhagen: CAS-Theory.

### Finland

University of Helsinki, Helsinki: CAS-Theory; CAS-Observations.

University of Turku - Finnish Centre for Astronomy with ESO (FINCA), Turku: MICADO.

### France

Aix-Marseille University, Marseille: CAS-Theory.

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

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

Centre National de la Recherche Scientifique, Paris: IN-ODE.

IAP, Paris: Nukleare Astrophysik.

IPAG, Grenoble: GRAVITY; GRAVITY+; MICADO; CAS-Observations; CAS-Theory.

IRAM, Grenoble: CAS-Observations.

IRAM, Saint-Martin-d'Hères: CAS-Observations; Galaxienentstehung.

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

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

Observatoire astronomique de Strasbourg, Strasbourg, ATHENA.

Observatoire de la Côte d'Azur Nice (OCA), Nizza: GRAVITY+.

Observatoire de Paris (GEPI), Paris: MICADO; GRAVITY.

Observatoire de Paris (LERMA), Paris: CAS-Theory.

Observatoire de Paris (LESIA), Paris: MICADO; GRAVITY.

Observatoire de Paris-Meudon, Paris: GRAVITY; GRAVITY+, Galaktisches Zentrum.

SOLEIL Synchrotron (AILES beamline), Saint-Aubin: CAS-Laboratory.

Université de Bordeaux, Bordeaux: CAS-Theory.

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

Université de Franche-Comté (UTINAM), Besançon: MICADO.

Université de Lyon (CRAL), Lyon: GRAVITY+; CAS-Observations.

Université de Rennes, Rennes: CAS-Laboratory; CAS-Observations.

Université de Toulouse, Toulouse: CAS-Observations; CAS-Laboratory.

Université Paris Diderot, Paris: CAS-Observations.

Université Paris-Saclay, Saclay: CAS-Laboratory; CAS-Observations.

## Germany

Astrophysikalisches Institut Potsdam, Potsdam: eROSITA; XMMNewton; OPTIMA; ARGOS; HETDEX; 4MOST.

Deutsches Elektronen-Synchrotron, Hamburg: CAS-Laboratory.

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

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

Fraunhofer Institut for Computer Graphics Research IGD, Darmstadt: IODE.

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

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

Institut für Astrophysik Göttingen, Göttingen: MICADO.

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

Institut für Materialphysik im Weltraum, Köln: Glasübergänge.

Landessternwarte Heidelberg-Königstuhl, Heidelberg:

Galaxienentstehung; ARGOS.

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

Ludwig-Maximilians-Universität, München: MICADO; HETDEX; eROSITA; CAS-Theory.

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

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

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

Max-Planck-Institut für Physik, Werner Heisenberg Institut, München: MPG Halbleiterlabor; Athena.

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

Physikalisch-Technische Bundesanstalt Berlin, Berlin: eROSITA.

Technische Universität Berlin, Berlin: Interstellares Medium.

Technische Universität Darmstadt, Darmstadt: CAST.

Technische Universität München, München: Nukleare Astrophysik; ESBO-DS.

Thüringer Landessternwarte Tautenburg, Tautenburg: GROND; Gamma-Ray Bursts.

Universität Bonn, Bonn: ATHENA; eROSITA; EUCLID; CAS-Observations.

Universität der Bundeswehr, München: SBNF.

Universität Düsseldorf, Düsseldorf: ERC Advanced Grant; CAS-Theory.

Universität Erlangen (ECAP), Erlangen: eROSITA; ATHENA.

Universität Hamburg, Hamburg: eROSITA; OPTIMA (Flarestars).

Universität Heidelberg, Heidelberg: ATHENA; XFEL; CAS-Theory.

Universität Jena, Jena: Isolierte Neutronensterne; Nukleare Astrophysik.

Universität Kassel, Kassel: CAS-Observations, CAS-Laboratory.

Universität Köln, Köln: Galaktisches Zentrum; GRAVITY; GRAVITY+; CAS-Observations; CAS-Theory; CAS-Laboratory.

Universität Mannheim, Mannheim: ATHENA; XFEL.

Universität Stuttgart, Stuttgart: ESBO-DS.

Universität Würzburg, Würzburg: AGADE.

## Greece

ATHENA RC, Research and Innovation Centre in Information, Communication and Knowledge Technologies, Athen: INODE.

Infil Technologies, Athen: INODE.

University of Crete and Foundation for Research and Technology Hellas (FORTH), Heraklion: Röntgendoppelsternsysteme; OPTIMA Photometer; Röntgen-AGN.

National Observatory of Athens, Athen: Athena; eROSITA.

## Hungary

Konkoly Observatory of the Hungarian Academy of Sciences, Budapest: SBNF; CAS-Observations; CAS-Theory.

Institute for Nuclear Research (ATOMKI), Debrecen: CAS-Laboratory.

**India**

Tata Institute of Fundamental Research, Mumbai: CAS-Observations.

**Iraq**

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

**Ireland**

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

University College Dublin: Fermi/GBM.

**Israel**

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

**Italy**

Free University of Bozen-Bolzano, Bozen: INODE.

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

INAF (Istituto Nazionale di Astrofisica), Rom: ATHENA; EUCLID.

INAF Arcetri, Florenz: ARGOS; LBT; ERIS; CAS-Observations; CAS-Theory.

INAF Padua, Padua: LBT; MICADO; ERIS.

INAF Roma, Rom: LBT; Nukleare Astrophysik.

INAF Teramo, Teramo: ERIS.

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

INFN Frascati, Frascati: SIDDHARTA.

Osservatorio Astronomico di Brera, Brera: Himmelsdurchmusterung Galaxienhaufen.

Osservatorio Astrofisico di Catania, Catania: CAS-Theory; CAS-Laboratory.

Scuola Normale Superiore, Pisa: CAS-Observations.

Università degli Studi di Firenze, Florenz: CAS-Observations; CAS-Theory.

Università degli Studi di Milano, Mailand: CAS-Observations.

Università degli Studi di Torino, Turin: CAS-Observations.

Università di Bologna, Bologna: EUCLID; CAS-Theory; CAS-Laboratory; CAS-Observations.

Università di Perugia, Perugia: CAS-Observations.

**Japan**

Academia Sinica, Nangang: PFS.

Kavli Institute for the Physics and Mathematics of the Universe, Kashiwa: PFS.

Kobe University, Kobe: CAS-Theory.

National Astronomical Observatory of Japan, Mitaka/Tokio: CAS-Theory; CAS-Observations; Galaxienentwicklung; PFS.

Institute of Physical and Chemical Research, Saitama: CAS-Observations.

Japan Aerospace Exploration Agency, Sagami-hara, Kagawa: SBNF.

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

University of Osaka, Osaka: Astro-H.

University of Tokyo, Tokyo: PFS; CAS-Observations.

University of Tokyo, Institutes for Advanced Study (UTIAS), Tokyo: PFS.

Tohoku University, Sendai: Galaxienentwicklung.

**Latvia**

Ventspils University College, Ventspils: CAS-Theory.

**Mexico**

Universidad Nacional Autonoma de México, Ensenada: CAS-Observations.

**Poland**

Nicolaus Copernicus University, Torun: Pulsars Astronomical Centers; ATHENA.

Space Research Center (CBK), Warschau: ATHENA WFI.

Astronomical Observatory Institute, Poznań: SBNF.

University Zielona Gora: OPTIMA.

**Portugal**

CENTRA Lissabon und Porto, Lissabon: GRAVITY; GRAVITY+.

Observatorio Astronomico de Lisboa, Lissabon: ATHENA.

Universidade de Coimbra, Coimbra: Departamento de Engenharia Química: CAS-Laboratory.

**Russia**

Baumann Moscow State Technical University, Moskau: Stark gekoppelte Systeme; Time-domain spectroscopy; CAS-Theory; CAS-Laboratory.

Institute of Astronomy, Moskau: CAS-Theory.

Lebedev Institute of Physics, Moskau: CAS-Theory.

Prokhorov General Physics Institute, Moskau: CAS-Laboratory.

Space Research Institute (IKI) of the Russian Academy of Science, Moskau: eROSITA/Spektrum Röntgen-Gamma.

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

Ural Federal University, Jekaterinburg: CAS-Theory.

**Sweden**

Chalmers University of Technology, Onsala Space Observatory, Onsala: CAS-Observations.

University Lund/Observatory, Lund: OPTIMA.

**Switzerland**

CERN, Geneva: CAST.

ETH Zürich, Zürich: ERIS.

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

Swiss Institute of Bioinformatics, Lausanne: INODE.

Universität Basel, Basel: Nukleare Astrophysik.

University of Geneva, Genf: ATHENA.

University of Zurich, Zürich: Infrared Dark Clouds.

Zürcher Hochschule für Angewandte Wissenschaften, Zürich: INODE.

**Spain**

Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas, Madrid: DES.

Centro de Astrobiología (CSIC/INTA), Madrid: CAS-Laboratory.

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

Instituto de Astrofísica de Andalucía (IAA), Granada: SBNF; ESBO-DS.

Instituto de Astrofísica de Canarias, La Laguna: SBNF.

Instituto de Ciencias del Espacio, Bellaterra: DES.

Instituto de Ciències de l'Espai, Cerdanyola del Vallès: CAS-Observations.

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

Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS), Javalambre: eROSITA follow up. SIRIS Academic SL, Barcelona: INODE.

Universitat Autònoma de Barcelona, Bellaterra: CAS-Observations.

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

Universidad de Zaragoza, Zaragoza: CAST.

Observatorio Astronómico de Mallorca, Costitx: Novae; Kometen.

Observatorio Astronómico Nacional, Madrid: CAS-Observations.

**South Korea**

Seoul National University, Seoul: Hayabusa-2.

**Taiwan**

Academia Sinica Institute of Astronomy and Astrophysics (ASIAA), Taipei: CAS-Theory; CAS-Observations; PFS.

National Central University, Chungli; PanSTARRS.

**The Netherlands**

ESTEC, Noordwijk: XMM-Newton; INTEGRAL; EUCLID; ATHENA; eROSITA.

JIVE Dwingeloo, Dwingeloo: Black Hole Cam.

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

Leiden University, Leiden: CAS-Observations; CAS-Theory; IR/Submm Spectroscopy.

Radboud University, Nijmegen: Black Hole Cam; CAS Laboratory.

SRON, Utrecht: Chandra-LETG.

University of Groningen, Kapteyn Institute, Groningen: Rekonstruktion der Dichteverteilung im Universum; EUCLID; Dynamical-Chemical Models; CAS-Theory; CAS-Observations.

**UK**

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

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

Queen's University, Belfast: PanSTARRS.

Queen Mary University of London, London, UK: CAS-Observations; CAS-Theory.

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

SKA Organisation, Jodrell Bank Observatory, Macclesfield: CAS-Observations.

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

University of Cambridge, Cambridge: DES; CAS-Theory.

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

University of Durham, Durham: PanSTARRS.

University of Edinburgh, Edinburgh: DES; PanSTARRS.

University of Leeds, Leeds: CAS-Theory.

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

University of Nottingham, Nottingham: DES.

University of Portsmouth, Portsmouth: DES.

University of Sussex, Brighton: DES.

University of Southampton, Southampton: GRAVITY+; Magellanic Clouds.

**USA**

Argonne National Laboratory, Lemont: DES.

Brookhaven National Laboratory, Upton: strahlenharte JFETElektronik; strahlenharte Detektoren.

Benedictine College, Atchison: CAS-Theory.

California Inst. of Technology, Pasadena: X-ray Survey; PFS.

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

Clemson University, Clemson: Gamma-Ray Bursts; Nukleare Astrophysik.

Fermilab, Batavia: DES.

Harvard University, Cambridge: PanSTARRS.

Harvard-Smithsonian Center for Astrophysics, Cambridge: CAS-Observations; CAS-Laboratory; CAS-Theory.

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

Johns Hopkins University, Baltimore: PanSTARRS; PFS.

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

MIT, Cambridge: ATHENA WFI.

NASA/Ames Research Center, Mofett Field (CA): MHD Shocks; SBNF.

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

NASA/Jet Propulsion Laboratory, Pasadena: EUCLID; PFS; CAS-Observations.

National Radio Astronomy Observatory, Charlottesville: CAS-Theory; CAS-Observations.

National Radio Astronomy Observatory, Socorro, New Mexico: CAS-Observations.

National Science Foundation, Arlington: CAS-Observations.

NOAO, Tucson: DES.

Ohio State University, Columbus: DES; LBT.

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

Pennsylvania State University, State College: HETDEX; Swift; ATHENA.

Princeton University, Princeton: PFS; CAS-Theory.  
 Research Corporation, Tucson: LBT.  
 San Jose State University, San Jose: MHD shocks.  
 SLAC, Stanford: CAMP; DES; ATHENA.  
 Smithsonian Astrophysical Observatory, Cambridge:  
 Chandra-LETGS; PanSTARRS; Röntgendoppelsterne in  
 M31; Athena.  
 Space Telescope Science Institute, Baltimore: Galaxien-  
 entstehung; PanSTARRS; Turbulence; SBNF.  
 Stanford University, Stanford: DES; Fermi/LAT; Fermi/  
 GBM.  
 Texas A & M University, College Station: DES; SBNF.  
 Texas State University, San Marcos: HETDEX.  
 University of Arizona, Tucson: Kosmische Strahlung; Pla-  
 netenentstehung; LBT; ARGOS; CAS-Observations; CAS-  
 Theory.  
 University of California, Berkeley: MPG/UCB-Kollaborati-  
 on; FAST; INTEGRAL-Spektrometer SPI; Superbubbles.  
 University of California, Santa Cruz: DES.  
 University of Chicago, Chicago: CAS-Observations; DES.  
 University of Colorado, Boulder (Co): Superbubbles; CAS-  
 Observations; Galaxienkerne.

University of Florida, Gainesville: Infrared Dark Clouds.  
 University of Hawaii, Honolulu, Hawaii: CAS-Theory.  
 University of Illinois, Urbana-Champaign: DES.  
 University of Massachusetts, Amherst: CAS-Observa-  
 tions.  
 University of Michigan, Ann Arbor: DES.  
 University of Nevada, Las Vegas: CAS-Observations.  
 University of Pennsylvania, State College: DES.  
 University of Pittsburgh, Pittsburgh: Galaxienentstehung.  
 University of Texas, Austin: Galaxienentstehung; HET-  
 DEX, CAS-Theory.  
 University of Texas, San Antonio: SBNF.  
 University of Toledo, Toledo: Galaxienentstehung; CAS-  
 Observations.  
 University of Virginia, Charlottesville: CAS-Theory; CAS-  
 Observations.  
 University of Wisconsin-Madison, Madison: CAS-Theory.  
 Yale University, New Haven: CAS-Observations.

## Multinational Collaborations - Projects

ARGOS - Laserleitstern für das LBT: Arcetri Observatory, Italy; AIP, LSW Heidelberg, MPIa, MPIfR, Germany; University of Arizona, USA.

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

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

BOSS - Baryon Oscillation Spectroscopic Survey: SDSSIV Collaboration.

Chandra: 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 - Cosmological 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, Dept. of Physics, Carnegie Mellon University, Pittsburg, Institute for Astronomy, University of Hawaii, California Institute of Technology, Pasadena, Dept. of Astronomy, Yale University, USA; INTEGRAL Science Data Centre, Versoix, Switzerland; Laboratoire d'Astrophysique de Marseille, France.

DES - 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 Físicas, Universidade Federal do Rio, Brasilien; Instituto de Ciencias del Espacio, Institut de Física d'Altes Energies, Centro de Investigaciones Energéticas Medioambientales y Tecnológicas, Spain.

eBOSS - SDSS-IV Extended Baryon Oscillation Spectroscopic Survey: Carnegie Mellon University (CMU), University of Colorado Boulder, Harvard-Smithsonian Center for Astrophysics Participation Group, Johns Hopkins Uni-

versity, Kavli Institute for the Physics and Mathematics of the Universe, New Mexico State University, New York University, The Ohio State University, Penn State University, University of Utah, University of Wisconsin, Yale University, USA; Max-Planck-Institut fuer Astrophysik (MPA Garching), Max-Planck-Institut für extraterrestrische Physik (MPE), Max-Planck-Institut für Astronomie (MPIA Heidelberg), Germany; National Astronomical Observatories of China, Shanghai Astronomical Observatory, China; United Kingdom Participation Group, University of Portsmouth, UK.

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

EinsteinProbe - Chinese Academy of Science, Institute of High Energy Physics, National Astronomical Observatories, China, ESA.

eROSITA - extended Roentgen Survey with an Imaging Telescope Array: AIP Potsdam, Universität Tübingen, Universität Bonn, Universität Erlangen, Universität Hamburg, Remis-Sternwarte Bamberg, MPA Garching, LMU (USM) München, Germany; IKI Moskau, Russia.

ESBO-DS - European Stratospheric Balloon Observatory - Design Study, EU H2020 project; University of Stuttgart, University of Tübingen, Germany; Swedish Space Corporation, Sweden; Instituto de Astrofísica de Andalucía, Spain.

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 Gamma-Ray Large Area Space 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.

GRAVITY - Instrument for VLT Interferometry: MPIA Heidelberg, Universität Köln, ESO Garching, Germany; CENTRA Lisbon and Porto, Portugal; IPAG Grenoble, Observatoire de Paris / Meudon (LESIA), France.

GRAVITY+ - VLT Interferometry upgrade project: MPIA Heidelberg, Universität Köln, ESO Garching, Germany; CENTRA Lisbon and Porto, Portugal; IPAG Grenoble, Ob-



servatoire de Paris / Meudon (LESIA), OCA Nice, CRAL Lyon, France; University of Southampton, UK; KU Leuven, Belgium.

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

INODE - Intelligent Open Data Exploration: Zürcher Hochschule für Angewandte Wissenschaften, Athena RC, Research and Innovation Center in Information, Communication and Knowledge Technologies, Fraunhofer Institute for Computer Graphics Research IGD, Infi li Technologies Private Company, Center National de la Recherche Scientifique, SIRIS Academic SL, Swiss Institute of Bioinformatics, Free University of Bozen-Bolzano.

INTAS - Cooperation of Western and Eastern European Scientists: 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 di Astrofisica Spaziale Frascati, Italy; N. Copernicus Astronomical Center Warsaw, Poland; Space Research Institute of the Russian Academy of Sciences Moscow, Russia; Laboratory for High Energy Astrophysics GSFC Greenbelt, USA.

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

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

MICADO - Multi-Adaptive Optics Imaging Camera for Deep Observations: ESO, LMU (USM), MPIA Heidelberg, IAG Göttingen, Germany; INAF-OAPD Padova, INAF-OAR Roma, Italy; A\* (an Austrian partnership comprising the University of Vienna, the University of Innsbruck, the University of Graz, and the University of Linz [with RICAM Linz]; specific contributions to MICADO come from Vienna/Innsbruck/Linz), Austria; NOVA (a federation several astronomical institutes; specific contributions to MICADO come from the University of Groningen, the University of Leiden, and the NOVA optical/infrared instrumentation group based at ASTRON in Dwingeloo), The Netherlands; CNRS/INSU (representing LESIA and GEPI, Paris, IPAG, Grenoble and UTINAM, Besançon), France; FINCA (University of Turku) Turku, Finland.

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

OPTIMA: AIP, MPI für Astrophysik, Universität Hamburg, Germany; University of Crete, Greece; University Zielona Gora, Poland; University Lund/Observatory, Schweden.

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

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

SBNF - Small Bodies Near and Far, EU H2020 project; Poznań, Poland; Instituto de Astrofísica de Andalucía, Granada, Instituto de Astrofísica de Canarias (IAC), Spain; Konkoly Observatory, Budapest, Hungary; Institute of Space and Astronautical Science (ISAS, JAXA), Kanagawa, Japan.

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

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

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

XMM-Newton/EPIC (European Photo Imaging Camera): 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.

## Industrial Collaborations

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

ABN GmbH, Neuried: Ongoing servicing of the MPE test facility PANTER.

AC Tech GmbH, Freiberg: ERIS Konus.

ACM GmbH, Naumburg - Acktar Ltd., Kiryat-Gat, Israel: Schwärzen für EUCLID und ERIS.

af inventions, Braunschweig: FPGA Programmierung für eROSITA.

AHC Oberflächentechnik GmbH / Aalberts Surface Technologies GmbH: coating for MICADO

ALPAO, Montbonnot-Saint-Martin, France: GRAVITY+ deformable mirrors.

Alwin Müller GmbH & Co. KG, Nürnberg: Oberflächenbeschichtung vieler Projekte.

Ariane Group GmbH, Munich: EUCLID design study, eROSITA, ATHENA, Oberflächenbeschichtung und cleanliness control EinsteinProbe.

Array Electronics, Eggingen: DAQ development OPTIMA.

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

BASF Coatings AG, Münster: Investigations on the scattering properties of micro particles.

Bräuninger & Konstruktionen, Neuried: Construction and manufacturing of laboratory equipment.

Buchberger GmbH, Tuchenbach: Manufacturing of parts for PANTER manipulators, ERIS telescope flange.

Carl Zeiss QEC GmbH, Garching b. München, Deutschland: Messdienstleistungen, EinsteinProbe.

Christian Rehm - ISKON, Isen: Design and mechanical engineering for MICADO, GRAVITY+.

CryoVac GmbH, Troisdorf: MICADO Cryostat; ERIS SPIFFI Upgrade.

DHL Special services, Flughafen München, EinsteinProbe.

Dico-Solutions, München: eROSITA Betrieb.

DoKaSch TEMPERATURE SOLUTIONS GmbH, Kelsterbach, Deutschland: klimatisierte Frachtcontainer, EinsteinProbe.

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

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

First Light Imaging, Meyreuil, France: GRAVITY+ wavefront sensor cameras.

Fraunhofer IOF, Jena: Mirror development for MICADO.

Freyer GmbH, Tuningen: PANTER.

Frühschütz Lohngalvanik GmbH, Penzberg: Oberflächenbeschichtung vieler Projekte.

GEWO Feinmechanik GmbH, Wörth/Hörlkofen: Mechanische Fertigung, ERIS.

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

Hans Englert GmbH, Berlin: Manufacturing of front panels and metering devices.

Hembach Photonik, Rednitzhembach, Optical Design, GRAVITY+.

HERMLE AG, Gosheim, Milling Machines, MPE Workshop.

HOC Optik Dr. Christoph Horneber, Lauf: GRAVITY+

Hochschule München, Laserlabor, Prof. Heinz Huber, München: Materialbearbeitung mit Ultrakurzpulsar laser.

Hyprostatik, Göppingen: MICADO Hydrostatik.

Industrieanlagen – Betriebsgesellschaft mbH (IABG), Otobrunn: Testanlagen, Luftfahrtsicherheit, EinsteinProbe.

Industrieberatung Reinhard Katterloher, München: Specifications for MICADO Test Cryostat.

Ingenieurbüro Josef Eder, Hilgertshausen: System engineering for eROSITA, ATHENA, ERIS, Einstein Probe.

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

Ingenieurbüro Michael Kautz, Regensburg, Design and mechanical engineering for CAS.

IRIDIAN Spectral Technologies, Ottawa, Ontario, Canada: ERIS Filters.

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

Korth Kristalle GmbH, Kiel: Lenses and windows for ERIS Spectrometer.

Kinkele GmbH & Co. KG, Ochsenfurt: ERIS Struktur.

LaserJob GmbH, Fürstfeldbruck, Deutschland: Präzisions-Laserzuschnitt und Schweißen EinsteinProbe.

LEX GmbH, Miesbach, Deutschland: Mechanische Fertigung, ATHENA, EinsteinProbe.

LT Ultra, Herdwangen-Schönach: Spiegelhersteller.

Feinmechanische Werkstätte Thomas Markl GmbH, Deisenhofen; eROSITA.

Medway Optics Ltd, Rainham, Kent, UK: Optical coatings for ERIS.

M-Industrieverpackung GmbH, Sulzemoos: ERIS Transportcontainer.

OHB System AG, München: EUCLID design study.

Peter Blank GmbH, Aschaffenburg: Mechanische Fertigung MICADO.

Peter Feckl Maschinenbau GmbH, Forstern: Mechanische Fertigung, ERIS, Spiegelmodule EinsteinProbe.

Plappert Industrieanlagen GmbH, Schorndorf: Design and mechanical engineering for MICADO Handling Tools.

Plasmatechnik Reusche, Jettingen-Scheppach: verzugs-  
freies Randschichthärten für ERIS.

Qioptic GmbH, Feldkirchen: Oberflächenbeschichtung  
vieler Projekte.

Steinmeyer Mechatronik, Dresden: GRAVITY+ translatio-  
nal stages.

Tafelmaier Dünnschicht-Technik, Rosenheim: Optical  
Coatings, GRAVITY+.

Unholtz-Dickie Corp., Wallingford, USA: Shaker System,  
MPE Test Facility.

### **Activities in Transfer of Know-How**

The high number of cooperations with industry and other  
research groups lead to a natural transfer of scientific  
and technical know-how, especially if orders are given to  
the industry.

By the end of 2021 the MPE held a total of 12 patents  
and 4 licences.