

Jahresbericht 2011

Argelander-Institut für Astronomie
Rheinische Friedrich-Wilhelms-Universität Bonn

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1 Allgemeines

Die wissenschaftliche Mitarbeiterin Dr. Kirsten Knudsen trat im Berichtsjahr eine Stelle als „Assistant Professor“ an der Chalmers University of Technology in Göteborg, Schweden an, Dr. Wouter Vlemmings trat eine Stelle als „Associate Professor“ an der Chalmers University of Technology in Göteborg und als Leiter des nordischen ALMA Regional Center (ARC) Knotens am Onsala Space Observatory an. Die langjährigen Sekretariatsleiterinnen Elisabeth Danne und Kathy Schrüfer gingen in den Ruhestand. Ihre Aufgaben werden nun von Ulrike Hamacher (Abt. Sternwarte) und Ellen Vasters (Abt. Astrophysik) wahrgenommen.

Das AIfA ist Gastgeber von zwei Emmy-Noether-Nachwuchsgruppen: Dr. Andrea Stolte leitet die Gruppe „Evolution of starburst clusters in the Milky Way,“ Dr. Olaf Wucknitz die Gruppe „Utilising the new generation of radio telescopes for gravitational lens research.“

Prof. Peter Schneider dient seit 1.10.2010 als Vorsitzender der Fachgruppe Physik / Astronomie.

Das AIfA und die Universitätsleitung beschlossen die Schließung des Observatoriums Hoher List zum 1.7.2012, wenn sich bis dahin kein neuer Träger zur Finanzierung des Betriebs findet.

Das AIfA ist an der durch die Exzellenz-Initiative geförderten *Bonn-Cologne Graduate School for Physics and Astronomy* (BCGS) zentral beteiligt, welche über 150 Studierende umfasst. Weiterhin ist das AIfA gemeinsam mit der Universität zu Köln an der *International Max-Planck Research School in Astronomy and Astrophysics* (IMPRS) beteiligt, die im benachbarten MPIfR beheimatet ist. Die *Bonn International Graduate School* (BIGS) rekrutiert und unterstützt Master Studenten und Doktoranden der Physik und Astrophysik seit 2001.

Wissenschaftler des AIfA sind in eine große Zahl von Kooperationen eingebunden. Das AIfA leitet die DFG-Forschergruppe FOR 1254 „Magnetisation of Interstellar and Intergalactic Media: The Prospects of Low-Frequency Radio Observations“ (Sprecher: U. Klein) und beteiligt sich mit fünf ortsübergreifenden Teilprojekten im Transregionalen Sonderforschungsbereich TR33 „The Dark Universe“ (gemeinsam mit Kollegen aus Heidelberg und München/Garching), sowie mit drei wissenschaftlichen Projekten am DFG SFB 956

„Conditions and Impact of Star Formation - Astrophysics, Instrumentation and Laboratory Research” (Sprecher J. Stutzki, Köln). Zudem ist das AIfA an neun verschiedenen Projekten im DFG-Schwerpunktprogramm 1177 „Galaxienentwicklung” beteiligt, mit drei Projekten am DFG SPP 1573 „Physics of the Interstellar Medium,” sowie am Marie Curie RTN-Netzwerk „DUEL.” Zu den weiteren Kooperationen gehört der Betrieb des deutschen *ALMA Regional Center* (ARC) Node und eines der OmegaCAM Datenzentren, sowie die Beteiligung am Betrieb des NANTEN2 Submillimeter-Teleskops in Chile und an der Vorbereitung des CCAT (Cerro Chajnantor Atacama Telescope) Projekts, der Vorbereitung der eROSITA und EUCLID Weltraummissionen, sowie die Beteiligung am zukünftigen „after Sloan-III” Spiders Projekt. Für CCAT wurde von den Universitäten Bonn und Köln im Grossgeräte-Programm der DFG/BMBF ein substanzieller Beitrag zu Finanzierung eingeworben.

Im Berichtsjahr 2011 wurden von der Instrumentierungsgruppe - mit der Werkstatt am Observatorium Hoher List und dem Elektroniklabor in Bonn - mehrere „Bonn-Shutter” fertiggestellt und ausgeliefert: Zwei Shutter (125mm x 125mm) für das Optical Detector Department (ODT) der ESO in Garching/ München, zwei Shutter (200mm x 100mm) für den MUSE-Spektrographen des ESO VLT, ein Shutter (100mm x 100mm) für das Calar Alto Observatorium in Spanien, ein Shutter (125mm x 125mm) für das T80 Teleskop des J-PAS (Javalambre Physics of the Accelerating Universe Astrophysical Survey) Projekts, ein Shutter (200mm x 200mm) für das AIP/PEPSI am LBT, vier Shutter (200mm x 200mm) für den AAO-HERMES Spektrographen (Australien). Für das Physikalische Institut wurde ein rechnergesteuertes Nanoamperemeter für den Betrieb von Photodioden entwickelt. Der Bachelor Praktikums Versuch wurde mit einem DADOS Spektrographen ausgerüstet (50 cm Hausteleskop). Die Gruppe beteiligte sich zudem am Aufbau des CCD-Praktikumversuchs. Zu den weiteren Aktivitäten der Instrumentierungsgruppe gehört die Entwicklung eines neuen Verfahrens zur absoluten Flusskalibration des SNIFS-Spektrographen des „Near Supernova Factory” Konsortiums.

Im Berichtsjahr waren Mitarbeiter/innen des AIfA durch populärwissenschaftliche Vorträge (u.a. 30 Abendvorträge) und andere Aktivitäten an der Öffentlichkeitsarbeit engagiert. Schwerpunkte lagen dabei auf den Themen Astronomie und Schule, Astronomie für Frauen und dem interdisziplinären Austausch mit fachfremden Disziplinen. Im Rahmen des Projekts „Astronomie/vor Ort” besuchten Institutsmitarbeiter mehr als 50 Schulklassen im Großraum Köln/Bonn. Dreissig Schülerinnen und Schüler leisteten 2011 ihr Berufspraktikum im AIfA ab. Mit Unterstützung des NRW-Landesprojekts „Zukunft durch Innovation” entstand im Institut das „Schülerlabor Küstner”, das im Rahmen der Physikwerkstatt Rheinland den Schulen Praktikumsplätze anbietet. Besondere Highlights waren die „Türöffner-Aktion” der „Sendung mit Maus,” bei der mehr als 1000 Kinder das AIfA besuchten und die Beteiligung beim Deutschland-Fest im Rahmen des Angebots der Bonner Universität und die Teilnahme an der „Einstiegs-Abi” Messe in Köln. MitarbeiterInnen des AIfAs beteiligten sich an dem „Bonner Sternhimmel,” einem Projekt der Bonner Amateurastronomen. Um besonders dem weiblichen Nachwuchs den Zugang zur Astronomie attraktiv zu gestalten beteiligte sich das AIfA an dem tasteMINT Projekt der Bonner Universität. Mit der Präsentation historischer Kometenaufnahmen gemeinsam mit Mondbildern des Kölner Künstlers H. Tholen im neuen Ausstellungsraum wurde der Dialog der Astronomie mit der Kunst am Observatorium Hoher List fortgesetzt. Drei interdisziplinäre Wochenendseminare (Kunst, Musik im Dialog mit der Astronomie), ein Chorkonzert und zahlreiche Führungen rundeten den Dialog der Astronomie mit anderen Disziplinen ab. Auch der Förderverein am Hohen List beteiligte sich mit zahlreichen Führungen an den monatlichen Vortragsveranstaltungen.

Aktuelle Forschungsarbeiten sowie weitere Information über das AIfA sind auf dem Internet (etwa durch den arXiv-Preprintserver und der Home-Page des Instituts) leicht verfügbar. Deshalb werden nachfolgend nur noch referierte Publikationen und Lehrbücher/ Monographien aufgeführt.

1.1 Personalstand

1.2 Professoren

F. Bertoldi (Geschäftsführender Direktor), R. Izzard, U. Klein, P. Kroupa, N. Langer (stellv. Geschäftsf. Direktor), C. Porciani, T. Reiprich (Heisenberg-Professor), P. Schneider

1.3 Emeritierte Professoren

P.W. Blum, P. Brosche, K.S. de Boer, H.J. Fahr, E.H. Geyer, W. Kundt, U. Mebold, G. Pröbß, M. Römer, W. Seggewiß, H. Volland

Wissenschaftliche Mitarbeiter:

Dr. M. Albrecht, Dr. F. Alves, Dr. A. Balaguera Antolinez, Dr. S. Banerjee, Dr. K. Basu, Dr. N. Ben Bekhti, Dr. P. Bett, Dr. J. Braithwaite, Dr. M. Cantiello (AIfA Fellow), Dr. O. Cordes, Dr. T. Dermine, Dr. V. Duez (AIfA Fellow), Dr. T. Erben, Dr. B. Famaey (Humboldt Fellow), Dr. R. Franco Hernández, Dr. M. Geffert, Dr. I. Georgiev, Prof. Dr. R. González Lópezlira, Dr. J. Hartlap, Dr. P. Heraudeau, Dr. H. Hildebrandt, Dr. S. Hilbert, Dr. K. Holhjem, Dr. H. Israel, Dr. J. Jasche, Dr. P. Kalberla, Priv.-Doz. Dr. J. Kerp, Dr. K. K. Knudsen (AR), Dr. R. Kuiper, Dr. A. Küpper, Dr. H. Lau, Dr. L. Lovisari, Dr. A. Ludlow, Dr. J. Mackey (Humboldt Fellow), Dr. M. Maercker (ESO Fellow), Dr. O. Marggraf, Dr. L. Marian, Dr. T. Maschberger, Dr. C. McCain, Dr. S. Mohamed (AIfA Fellow), Dr. E. Moreno Mendez (AIfA Fellow), Dr. S. Mühle, Dr. R. Nakajima, Dr. U. Naß, Dr. H. Neilson (Humboldt Fellow), Dr. F. Pacaud, Dr. G. Parmentier, Dr. J. Pflamm-Altenburg, Dr. S. Ramstedt, Dr. K. Reif, Dr. E. Romano-Diaz, Dr. R. Schaaf, Dr. M. Schirmer, Dr. T. Schrabback-Krahe, Dr. Y. Schuberth, Dr. X. Shi, Dr. M. Siewert, Dr. P. Simon, Dr. D. Sluse, Dr. R. Smith (Humboldt Fellow), Dr. V. Smolčić (ESO Fellow), Dr. M. Sommer (Nord), Dr. A. Stolte (DFG/Emmy-Noether), Dr. T. Tauris, Dr. I. Thies, Dr. R. Torres Lopez, Dr. W. Vlemmings (DFG/Emmy-Noether), Prof. Dr. C. Watts (DAAD Fellow), Dr. B. Winkel, Dr. X. Wu, Dr. O. Wucknitz (DFG/Emmy-Noether), Dr. D. Xu (AIfA Fellow), Dr. S.-C. Yoon, Dr. Y. Zhang, Dr. J. Zönnchen

Doktoranden:

S. Anderl, L. Boldt, M. Brockamp, C. Brüns, S. Burkutean, E. Carrillo, M. Compostella, J. Dabringhausen, V. Darmstädter, M. de Lima Leal Ferreira, M. den Heijer, H. Eckmiller, A. Elia, S. Faridani, L. Flöer, P. Greskovic, P. Günster, M. Habibi, B. Hußmann, F. Kirsten, M. Klein, K. Köhler, A. Kozyreva, S. Kühnrich, F. Lügghausen, H. Mahmoudian, M. Marks, S. Martin, D. Meyer, B. Miranda Ocejó, A. Nagarajan, A. Najafi, S. Nasoudi Shoar, S. Oh, E. Pastor Mira, M. Pawlowski, A. Pérez Sánchez, J. Piel, J. Pollack, A. Purkayastha, M. Ramos Ceja, N. Roth, H. Saghiha, S. Salim, P. Schmidt, F. Schneider, Z. Shafee, Z. Sheikhabaee, X. Shi, M. Sokaliwska, G. Surcis, M. Tomassetti, M. Trasatti, B. Vijaysarathy, F. Volino, P. Wilking, D. Wuttke

Diplomanden:

A. Damm, A. Dierks, K. Enders-Brehm, M. Hofmann, M. Huhnen-Venedey, A. Ippendorf, V. Jaritz, L. Klarman, D. Kübler, C. Schulz, M. Venzmer

Master of Science in Astrophysik (1st year)

M. Badea, T. Badescu, A. Bemis, C. Fletcher, N. Gupta, M. Kierdorf, D. Klaes, M. Kruczkow, P. Lieberz, O. Lux, D. Mülheims, Y. Ordenes Briceno, R. Pandit, C. Saliba, K. Sendlinger, S. Sreenivasan, S. Thölken, R. Wollmann

Master of Science in Astrophysik (2nd year)

M. Asgari, J. Barrera Ballesteros, K. Borm, M. Borzyszkowski, R. Hanson, J. Ibañez Mejía, D. Keller, I. Mohammed, T. Röhser, R. Röseler, G. Schellenberger, S. Sengupta, R. Toma, A. Tudorica

Sekretariat und Verwaltung:

E. Danne, U. Hamacher, E. Kramer, S. Polder (Hoher List), K. Schrüfer, K. Sörgel, C. Stein-Schmitz (Geschäftsführung), E. Vasters

Technisches Personal:

A. Bödewig, M. Polder (Hoher List), Dipl.-Ing. H. Poschmann, Dipl.-Phys. P. Müller, H. Saxler (Hoher List), F.-J. Willems (Hoher List)

Studentische Mitarbeiter:

D. Elsen, J. Erler, T. Guttenberger, D. Markus, D. Mülheims, V. Thiel, C. Weigelt, S. Werner

1.4 Personelle Veränderungen

Ausgeschieden:

M. Asgari, J. Barrera Ballesteros, Dr. P. Bett, Dr. M. Cantiello, E. Danne, A. Damm, A. Dierks, Dr. R. Franco Hernández, P. Günster, T. Guttenberger, R. Hanson, Dr. J. Hartlap, Dr. P. Heraudeau, Dr. S. Hilbert, M. Hofmann, Dr. K. Holhjem, M. Huhnen-Venedey, A. Ippendorf, V. Jaritz, Dr. J. Jasche, Dr. K. K. Knudsen, D. Kübler, Dr. R. Kuiper, Dr. T. Maschberger, B. Miranda Ocejó, Dr. E. Moreno Mendez, A. Najafi, E. Pastor Mira, S. Polder, Dr. M. Schirmer, P. Schmidt, K. Schrüfer, Dr. Y. Schubert, K. Sörgel, G. Surcis, Dr. R. Torres Lopez, M. Venzmer, Dr. W. Vlemmings, Dr. F. Volino, Prof. Dr. C. Watts (DAAD Fellow), F.-J. Willems, D. Wuttke

Neueinstellungen und Änderungen des Anstellungsverhältnisses:

Dr. F. Alves, Dr. T. Dermine, U. Hamacher, Dr. H. Lau, Dr. L. Lovisari, Dr. C. McCain, Dr. S. Mohamed, Dr. S. Mühle, Dr. R. Nakajima, Dr. E. Romano-Diaz, Dr. T. Schrabback-Krahe, Dr. D. Sluse, Dr. E. van Uitert, E. Vasters, Dr. X. Wu

1.5 Lehrtätigkeiten

Die Vorlesungsverzeichnisse können eingesehen werden unter <http://www.astro.uni-bonn.de/students/lecture/>.

2 Diplomarbeiten, Dissertationen, Habilitationen

2.1 Diplomarbeiten

Abgeschlossen:

M. den Heijer: The Tully-Fisher relation for early-type galaxies with Westerbork HI data

V. Jaritz: Chandra X-ray Study of a Galaxy Cluster Sample: Intracluster Gas Temperature Profiles

M. Venzmer: Wechselwirkung von Gezeiten-Gas des Magellanschen Systems mit dem Halo der Milchstrasse

Laufend:

L. Klarmann: Heating of a disk of satellite galaxies around a major host galaxy

C. Schulz: The frequency of star formation rates in a galaxy cluster assembly

2.2 Masterarbeiten

Abgeschlossen:

- M. Asgari: Generalizing a cosmic shear analysis method, COSEBIs, to higher dimensions in parameter space and tomography
- R. Hanson: Decomposition of the matter power spectrum
- M. Ramos Ceja: Constraints on the universal pressure profile through the Sunyaev-Zel'dovich power spectrum
- H. Saghiha: Third-order aperture measures with the Millennium Simulation
- B. Vijaysarathy: AGN heating in galaxy groups

Laufend:

- K. Borm: X-ray galaxy cluster observations with eROSITA
- M. Borzyszkowski: Investigating the correspondence of dark matter halos and linear density peaks
- J. Ibañez Mejía: The Tayler instability in stars
- D. Keller: Population synthesis of planetary nebulae
- D. Lenz: Interaction of high-velocity clouds with the Milky Way galaxy
- I. Mohammed: Cosmological constraints from galaxy cluster surveys
- T. Röhser: The Milky Way windows to the distant universe
- R. Röseler: Constrained correlation functions in multi-dimensions
- G. Schellenberger: Chandra X-ray study of a galaxy cluster sample
- S. Sengupta: Nova re-accretion model for J-type carbon stars: a population synthesis study
- A. Tudorica: Star formation history of the IKN dwarf spheroidal from optical-NIR photometry of its globular clusters

2.3 Dissertationen

Abgeschlossen:

- K. Holhjem: Shear-selection of galaxy clusters in the KIDS survey
- A. Küpper: Dynamical evolution of massive star clusters
- T. Maschberger: The formation, dynamics and stellar content of star clusters
- E. Pastor-Mira: Aperture statistics for Virgo simulation
- G. Surcis: High resolution magnetic field measurements in high-mass star forming regions
- I. Thies: Induced planet formation in star clusters
- F. Volino: Observations and modelling of radio lenses

Laufend:

- S. Anderl: Modelling shocks in the interstellar medium
- L. Boldt: Magnetohydrodynamics in stars
- M. Brockamp: Massive black holes in galaxies
- C. Brüns: Untersuchung der Struktur von elliptischen Galaxien mit Hilfe numerischer Simulationen
- S. Burkutean: The Sunyaev-Zel'dovich effect in galaxy clusters with interferometry
- E. Carrillo: The dense gas in the Magellanic Clouds
- M. Compostella: The intergalactic medium and reionization: a numerical perspective
- J. Dabringhausen: The stellar initial mass function in massive star clusters
- V. Darmstädter: Searching for compact high-velocity clouds in the northern and southern sky using EBHIS and GASS data
- H. Eckmiller: Testing X-Ray Scaling Relations with a Sample of Galaxy Groups and Detailed Analysis of Abell 2244 with Chandra and Suzaku
- A. Elia: Large scale structure and dark energy
- S. Faridani: The baryon budget of nearby galaxies
- M. Ferreira: Magnetic Fields and the Formation of A-spherical of Planetary Nebulae
- L. Flør: Exploration of the Local Universe in HI
- M. Habibi: Starburst clusters near the centre of the Galaxy
- B. Hußmann: The mass function of the Quintuplet cluster
- F. Kirsten: Pulsar Astrometry with VLBI
- M. Klein: A joint mass analysis of galaxy clusters from weak gravitational lensing and Sunyaev-Zel'dovich measurements
- K. Köhler (Friedrich): Massive stars on the main sequence
- A. Kozyreva: Pre-supernova evolution of massive stars
- S. Kühnrich: Evolutionary models of interacting massive close binary stars
- F. Lüghausen: Numerical N-body computations of galaxies in Milgromian dynamics
- H. Mahmoudian: HST observations of gravitational lens B0218+357
- M. Marks: Dynamical fingerprints of star cluster formation
- S. Martin: Galaxy-galaxy-galaxy lensing to investigate common dark matter halos of galaxies
- D. Meyer: Models for the circumstellar medium of massive runaway stars
- B. Miranda Ocejó: Study of the outskirts of galaxy clusters with X-rays
- A. Nagarajan: The structure and properties of intra cluster gas in galaxy clusters
- A. Najafi: Weak lensing and photometric analysis of the supercluster field A266/268
- S. Nasoudi Shoar: Small-scale studies of the Milky Way disc and halo gas with absorption-line spectroscopy
- F. Navarrete Avendano: The far-infrared-radio correlation in the COSMOS survey data
- S. Oh: Massive stars in young star clusters
- M. Pawlowski: Formation of Tidal Dwarf Galaxies in Galaxy Encounters
- A. Pérez Sánchez: Molecular line emission in asymmetric envelopes of evolved stars
- J. Piel: Investigating galaxy clusters with weak gravitational lensing and X-rays

J. Pollack: The bispectrum as a probe into halo bias
A. Purkayastha: Magnetization of the IGM: Role of starburst dwarf galaxies
M. Ramos Ceja: Cosmology with X-ray galaxy cluster surveys
N. Roth: Cosmology and large scale structure
H. Saghiha: Quantitative analysis of galaxy-galaxy-galaxy lensing
S. Salim: Star formation in high redshift galaxies
P. Schmidt: Searching for Direct Disk-Satellite Interaction in the Warped Spiral Galaxies NGC 4013 and NGC 5907
F. Schneider: The effects of stellar and close binary evolution on the present day mass function
Z. Shafee: Lensing studies in the Kilo Degree Survey
Z. Sheikhabaee: Mass and light in the Abell 226/228 supercluster
X. Shi: Elimination of alignment systematics in higher-order shear correlations
M. Sokaliwska: Nuclear star clusters
M. Tomassetti: Numerical simulations of galaxy formation
M. Trasatti: Exploring the nature of radio halos and relics in galaxy clusters
B. Vijaysarathy: Detailed X-ray properties of galaxy groups and fossil groups
U. Wernick: Pulsarwind Dynamik
D. Wuttke: Strong and weak lensing analysis of the mass distribution in massive clusters

3 Veröffentlichungen

3.1 In Zeitschriften und Büchern

Adami, C., Mazure, A., Pierre, M., Sprimont, P. G., Libbrecht, C., and 27 colleagues: The XMM-LSS survey: optical assessment and properties of different X-ray selected cluster classes, *A&A* **526** (2011), A18
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Alves, F. O., Girart, J. M., Lai, S. -P., Rao, R., and Zhang, Q: The Magnetic Field in the NGC 2024 FIR 5 Dense Core, *ApJ* **726** (2011), 63A
Amiri, N., Vlemmings, W., van Langevelde, H. J.: The kinematics and magnetic fields in water-fountain sources based on OH maser observations, *A&A* **532** (2011), A149
Angus, G. W., Diaferio, A., Kroupa, P.: Using dwarf satellite proper motions to determine their origin, *MNRAS* **416** (2011), 1401–1409
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- Banerjee, S., Kroupa, P.: A New Type of Compact Stellar Population: Dark Star Clusters, *ApJ* **741** (2011), L12
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