Dr. Andreas Faltenbacher

- **E-mail**: faltenbacher@gmail.com

- **Education**

Diploma in Physics (1999)	1.0
Promotion in Astrophysics (2004)	1.4
NRF Raating (2015)	B

- **Appointments held**

2000 - 2004	PhD, Astrophysikalisches Institut Potsdam
2004 - 2012	Postdoctoral Researcher at: Hebrew-University Jerusalem, University of California Santa Cruz, Shanghai Astronomical Observatory, Max Planck Institute for Astrophysics, University of the Western Cape
2012 - 2015	Senior Lecturer at the University of the Witwatersrand
2015 - 2017	Associate Professor at the University of the Witwatersrand
2018 -	Honorary Assoc. Professor at the University of the Witwatersrand

Major achievements during academic career:
- ca. 70 presentations (conferences, public talks)
- 49 publications (14 first author)
- Supervision of 11 postgraduate degrees (Honors, Masters, PhD)

- **Current employment**

Jan. 2018 - Senior/Principal Data Scientist at ONE LOGIC GmbH

Project experience:
- Car Industries (Virtual Build to Order, Recommneder systems, Natrual Language Processing)
- Petrochemistry (Predictive Maintenance)
- Chemical Industry (Forecasting, Supply chain optimization)
- Bio - Technologies (Data Warehousing)

- **Area of expertise**

◦ Gravitational N-body simulations (Cosmology)
◦ Hydrodynamical Simulations (Astrophysiks/Cosmology)
◦ Statistical analysis of big data (software development)
◦ Machine Learning:
Classification, Forecasting, Predictive Maintenance, Recommender Systems

- **Publications**

2000-2018	48	articles
	14	first author papers (peer reviewed)
	22	coauthor papers (peer reviewed)
	12	Conference proceedings and other papers
		(*detailed list appended below*)

- **Computer skills**

Programming proficiency
◦ SQL
◦ Python (2/3)
◦ Matlab
◦ R
◦ Shell scripting (bash)
◦ Fortran, IDL
◦ Parallel computing: Apache Spark, OpenMP, MPI

Software & data processing
◦ Data Bases (MSSQL, PostgreSQL)
◦ API (REST, SOAP)
◦ Virtual Machine and Container Technologies

Management & administration
◦ Development Tools (Scrum, Kanban)
◦ Office 365
◦ LibreOffice
◦ Latex

Operating systems
◦ Linux (Suse/Debian/Ubuntu/Ubuntu Server)
◦ Windows

- **Teaching and course coordination (2011 - 2017)**

2017	Teaching Honours course: *Astrophysical Fluid Dynamics* Coordination and teaching 2nd - 3rd year Astronomy Courses at Wits Teaching Computational Astronomy, NASSP MSc course, UCT
2016	Coordination Physics and Mechanics for Engineers at Wits Coordination and teaching 1st - 3rd year Astronomy Courses at Wits Teaching Computational Astronomy, NASSP MSc course, UCT
2015	Coordination Physics and Mechanics for Engineers at Wits Coordination and teaching 1st - 2rd year Astronomy Courses at Wits Teaching Computational Astronomy, NASSP MSc course, UCT
2014	Teaching Introduction to Astrophysics at Wits Coordination and teaching Introduction to Astronomy at Wits Teaching Computational Astronomy, NASSP MSc course, UCT
2013	Coordination Physics and Mechanics for Engineers at Wits Teaching Physics and Mechanics for Engineers at Wits Teaching Computational Astronomy, NASSP MSc course, UCT
2012	Teaching first year astronomy course at UWC Mechanics and Modern Physics for Engineers at Wits
2011	Teaching first year astronomy course at UWC Teaching Computational Astronomy, NASSP MSc course Tutoring 'Introduction to Quantum Mechanics' Teaching 'Astronomy for Engineers' at Stellenbosch University

- **Supervision (2011 - 2018)**

2018	Supervision of PhD project of Ayman Kudoda (2015 - 2018)
2017	Supervision of MSc project of Matthew Unterslak (2016 - 2017) Supervision of honors project of Daniela Guerinoni Supervision of honors project of William Matthewson Supervision of honors project of Tanita Ramburuh-Hurt
2016	Supervision of MSc project of Justin Fisher (2015 - 2016) Supervision of Honours project of Liantsoa Randrianjanahary
2015	Supervision of MSc project of Ayman Kudoda (2014 - 2015) Supervision of Honours project of Matthew Unterslak
2014	Co-supervision of PhD project of Zolile Mguda Supervision of Honours project of Justin Fisher
2013	Supervision of honors project of Eliab Malefahlo
2012	Co-supervision of PhD project of Daniel Cunnama Supervision of honors project of Vuyani Mampofu
2011	Supervision of honors project of Sambatra Andrianomena

- **Scientific & public talks (2011 - 2017)**

2017	· New Astornomy - Discopvery of Exoplanets, Ridgeway College Makhado, National Science Week
2016	· Lagrangian methods of cosmic web classification, Haifa
	· Graviational Waves: What? Why? How?
2015	· Photons - Messengers from the distant past, Wits
	· New Horizons, Wits Planetarium
	· Simulating the Dark, University of Khartoum
2014	· Dynamical Aspect of Halo / Galaxy Bias, Cape Town
	· The Copernican Principle, National Science Week, Wits
	· Astronomy, Power of Pictures, Vuyani-Primary, Gugulethu
	· Imaging the radio sky, Wits, Johannesburg
2013	· Dynamical aspect of halo/galaxy bias, ICTP, Trieste
	· Big data for free, CHPC, Cape Town
	· Search for Exoplanets, Wits, Johannesburg
	· Extragalactic Background Light, NWU, Potchefstroom
	· HI abundance matching, AIP, Potsdam
2012	· Anisotropy at very large scales, AIMS
	· Simulating the universe, CTICS, Stellenbosch
	· Anisotropy at BAO scales, AIP, Potsdam
	· The Search for Dark Matter, SAAO, Cape Town
2011	· Velocity-shape alignment of galaxy clusters, Durban
	· Satellite dynamics as a function of environment, Hangzhou
	· Large scale anisotropy in the galaxy distribution, Shanghai
	· Why astronomy? Public talk at SAAO, Cape Town
	· Satellite dynamics and galaxy formation, MPE, Garching
	· Current questions in modern cosmology, ROD, UWC
	· Modelling the HI correaltion function

- **Academic citizenship**

2005-2017	Acting as referee for: · *Monthly Notices of the Royal Astronomical Society* · *Astrophysical Journal*
2012-2017	Serving as External Examiner for UKZN & UCT astronomy courses
2015-2017	Serving at various SKA bursary advisory panels
2015-2017	Serving at NASSP Honors & MSc bursary advisory panels
2017-2017	Serving at the Wits Knowledge Resources Committee
2013-2016	Serving at various NRF bursary advisory panels
2014-2015	Serving at the Wits Undergraduate Affairs Committee

- **Outreach**

2017	Coordination of School of Physics Contribution to *Wits Experiencs In Integrated Science And Comerce (WIES2017)* Organisation of Physics Contribution to National Science Week at Wits Astronomy Exhibition in Makhado, Limpopo
2016	Astronomy Exhibition in Makhado, Limpopo
2015	Astronomy Exhibition in Makhado, Limpopo Astronomy exhibition at Yebo Gogga, Wits
2014	Organisation of Physics Exhibition at National Science Week
2013	Organisation of Physics Exhibition at National Science Week
2009-2017	Organisation of / participation in public stargazing events
2009-2017	Public talks on various astronomy topics

- **List of publications**

First author papers:

1. A. Faltenbacher, C. Li, and J. Wang. Anisotropy in the matter distribution beyond the BAO scale. ApJ, 751:L2–L6, May 2012

2. A. Faltenbacher. The impact of environment on the dynamical structure of satellite systems. MNRAS, pages 1152–+, August 2010.

3. A. Faltenbacher, A. Finoguenov, and N. Drory. The Halo Mass Function Conditioned on Density from the Millennium Simulation: Insights into Missing Baryons and Galaxy Mass Functions. ApJ, 712:484–493, March 2010.

4. A. Faltenbacher and S. D. M. White. Assembly Bias and the Dynamical Structure of Dark Matter Halos. ApJ, 708:469–473, January 2010.

5. A. Faltenbacher, C. Li, S. D. M. White, Y.-P. Jing, Shu-DeMao, and J. Wang. Alignment between galaxies and large-scale structure. *Research in Astronomy and Astrophysics*, 9:41–58, January 2009.

6. A. Faltenbacher, Y. P. Jing, C. Li, S. Mao, H. J. Mo, A. Pasquali, and F. C. van den Bosch. Spatial and Kinematic Alignments between Central and Satellite Halos. ApJ, 675:146–155, March 2008.

7. A. Faltenbacher, Y. Hoffman, S. Gottlöber, and G. Yepes. Entropy of gas and dark matter in galaxy clusters. MNRAS, 376:1327–1334, April 2007.

8. A. Faltenbacher, C. Li, S. Mao, F. C. van den Bosch, X. Yang, Y. P. Jing, A. Pasquali, and H. J. Mo. Three Different Types of Galaxy Alignment within Dark Matter Halos. ApJ, 662:L71–L74, June 2007.

9. A. Faltenbacher and W. G. Mathews. The concentration-velocity dispersion relation in galaxy groups. MNRAS, 375:313–323, February 2007.

10. A. Faltenbacher and J. Diemand. Velocity distributions in clusters of galaxies. MNRAS, 369:1698–1702, July 2006.

11. A. Faltenbacher and W. G. Mathews. On the dynamics of the satellite galaxies in NGC 5044. MNRAS, 362:498–504, September 2005.

12. A. Faltenbacher, B. Allgood, S. Gottlöber, G. Yepes, and Y. Hoffman. Imprints of mass accretion on properties of galaxy clusters. MNRAS, 362:1099–1108, September 2005.

13. A. Faltenbacher, A. V. Kravtsov, D. Nagai, and S. Gottlöber. Supersonic motions of galaxies in clusters. MNRAS, 358:139–148, March 2005.

14. A. Faltenbacher, S. Gottlöber, M. Kerscher, and V. Müller. Correlations in the orientations of galaxy clusters. A&A, 395:1–9, November 2002.

Publications resulting from student supervision:

1. A. M. Kudoda and A. Faltenbacher. Detailed modelling of the EBL along VHE γ-ray paths. MNRAS, 481(1):405–413, Nov 2018.

2. J. D. Fisher and A. Faltenbacher. Cosmic web type dependence of halo clustering. MNRAS, 473(3):3941–3948, Jan 2018.

3. A. M. Kudoda and A. Faltenbacher. Effects of spatial fluctuations in the extragalactic background light on hard gamma-ray spectra. MNRAS, 467(3):2896–2902, May 2017.

4. J. D. Fisher and A. Faltenbacher. Cosmic Web Type Dependence of Halo Clustering. *arXiv e-prints*, page arXiv:1603.06955, Mar 2016.

5. J. D. Fisher, A. Faltenbacher, and M. S. T. Johnson. Lagrangian methods of cosmic web classification. MNRAS, 458(2):1517–1528, May 2016.

6. Zolile Mguda, Andreas Faltenbacher, Kurt van der Heyden, Stefan Gottlöber, Catherine Cress, Petri Vaisanen, and Gustavo Yepes. Ram pressure statistics for bent tail radio galaxies. MNRAS, 446(4):3310–3318, Feb 2015.

7. D. Cunnama, S. Andrianomena, C. M. Cress, A. Faltenbacher, B. K. Gibson, and T. Theuns. The environmental dependence of neutral hydrogen in the GIMIC simulations. MNRAS, 438(3):2530–2537, Mar 2014.

8. D. Cunnama, A. Faltenbacher, C. Cress, and S. Passmoor. The velocity-shape alignment of clusters and the kinetic Sunyaev-Zeldovich effect. MNRAS, 397(1):L41–L45, Jul 2009.

Coauthored papers:

1. Cheng Li, Y. P. Jing, A. Faltenbacher, and Jie Wang. The Detection of the Large-scale Alignment of Massive Galaxies at z ~0.6. ApJ, 770(1):L12, Jun 2013.

2. S. Passmoor, C. Cress, A. Faltenbacher, R. Johnston, M. Smith, A. Ratsimbazafy, and B. Hoyle. Probing the bias of radio sources at high redshift. MNRAS, 429(3):2183–2190, Mar 2013.

3. Chris Clarkson, George F. R. Ellis, Andreas Faltenbacher, Roy Maartens, Obinna Umeh, and Jean-Philippe Uzan. (Mis)interpreting supernovae observations in a lumpy universe. MNRAS, 426(2):1121–1136, Oct 2012.

4. A. S. Baran, M. Winiarski, J. Krzesiński, L. Fox-Machado, S. D. Kawaler, M. Dróżdz, A. Faltenbacher, M. A. Thompson, and et al.,. Mt. Suhora Survey - Searching for Pulsating M Dwarfs. I. ActaA, 61(1):37–58, Mar 2011.

5. S. S. Passmoor, C. M. Cress, and A. Faltenbacher. Clustering of H I galaxies in the H I Parkes All Sky Survey and Arecibo Legacy Fast ALFA Survey. MNRAS, 412(1):L50–L54, Mar 2011.

6. Youcai Zhang, Xiaohu Yang, Andreas Faltenbacher, Volker Springel, Weipeng Lin, and Huiyuan Wang. The Spin and Orientation of Dark Matter Halos Within Cosmic Filaments. ApJ, 706(1):747–761, Nov 2009.

7. J. Zavala, Y. P. Jing, A. Faltenbacher, G. Yepes, Y. Hoffman, S. Gottlöber, and B. Catinella. The Velocity Function in the Local Environment from

ΛCDM and ΛWDM Constrained Simulations. ApJ, 700(2):1779–1793, Aug 2009.

8. C. Y. Jiang, Y. P. Jing, A. Faltenbacher, W. P. Lin, and Cheng Li. A Fitting Formula for the Merger Timescale of Galaxies in Hierarchical Clustering. ApJ, 675(2):1095–1105, Mar 2008.

9. Emilio Romano-Diaz, Yehuda Hoffman, Clayton Heller, Andreas Faltenbacher, Daniel Jones, and Isaac Shlosman. Evolution of Characteristic Quantities for Dark Matter Halo Density Profiles. ApJ, 657(1):56–70, Mar 2007.

10. Emilio Romano-Diaz, Andreas Faltenbacher, Daniel Jones, Clayton Heller, Yehuda Hoffman, and Isaac Shlosman. Constrained Cosmological Simulations of Dark Matter Halos. ApJ, 637(2):L93–L96, Feb 2006.

11. William G. Mathews, Andreas Faltenbacher, and Fabrizio Brighenti. Heating Cooling Flows with Weak Shock Waves. ApJ, 638(2):659–667, Feb 2006.

12. Brandon Allgood, Ricardo A. Flores, Joel R. Primack, Andrey V. Kravtsov, Risa H. Wechsler, Andreas Faltenbacher, and James S. Bullock. The shape of dark matter haloes: dependence on mass, redshift, radius and formation. MNRAS, 367(4):1781–1796, Apr 2006.

13. William G. Mathews, Andreas Faltenbacher, Fabrizio Brighenti, and David A. Buote. Baryonically Closed Galaxy Groups. ApJ, 634(2):L137–L140, Dec 2005.

14. S. Gottlöber, M. Kerscher, A. V. Kravtsov, A. Faltenbacher, A. Klypin, and V. Müller. Spatial distribution of galactic halos and their merger histories. A&A, 387:778–787, Jun 2002.

Conference proceedings and other papers:

1. S. Blyth, A. J. Baker, B. Holwerda, A. Bouchard, B. Catinella, L. Chemin, D. Cunnama, R. Davé, and et al.,. LADUMA: Looking at the Distant Universe with the MeerKAT Array. In *MeerKAT Science: On the Pathway to the SKA*, page 4, Jan 2016.

2. R. R. Mekuria, S. Colafrancesco, A. Faltenbacher, and P. Marchegiani. Multi-wavelength emissions from dark matter annihilation processes in galaxy clusters using cosmological simulations. In *The 4th Annual Conference on High Energy Astrophysics in Southern Africa (HEASA 2016)*, page 9, Jan 2016.

3. A. M. Kudoda and A. Faltenbacher. Fluctuation in the Extragalactic Background Light. In *3rd Annual Conference on High Energy Astrophysics in Southern Africa (HEASA2015)*, page 20, Jan 2015.

4. Ayman M. Kudoda and Andreas Faltenbacher. Impact of the Fluctuations in the Extragalactic Background Light on the γ-ray Attenuation of the Quasars. *arXiv e-prints*, page arXiv:1510.00590, Oct 2015.

5. Y. P. Jing, C. Y. Jiang, T. Okunmura, A. Faltenbacher, C. Li, and W. P. Lin. *Mergers of Galaxies and Orientation of Giant Elliptical Galaxies*, volume 408, page 328. 2009.

6. Y. P. Jing, C. Y. Jiang, A. Faltenbacher, W. P. Lin, and Cheng Li. Merger time scale of galaxies. In Carlo Luciano Bianco and She-Sheng Xue, editors, *Relativistic Astrophysics*, volume 966, pages 69–70, Jan 2008.

7. Y. Hoffman, E. Romano-Diaz, A. Faltenbacher, D. Jones, C. Heller, and I. Shlosman. Constrained Simulations of Dark Matter Halos. In Gary A. Mamon, Francoise Combes, Cedric Deffayet, and Bernard Fort, editors, *EAS Publications Series*, volume 20, pages 15–18, Jan 2006.

8. A. Faltenbacher, S. Gottloeber, and W. G. Mathews. Oscillatory relaxation of a merging galaxy cluster. *arXiv e-prints*, pages astro–ph/0609615, Sep 2006.

9. Andreas Faltenbacher and Stefan Gottlöber. Correlating Galaxy Properties. In Ralf Bender and Alvio Renzini, editors, *The Mass of Galaxies at Low and High Redshift*, page 174, Jan 2003.

10. A. Faltenbacher and S. Gottlöber. *Alignment of Main Axes of Galaxy Clusters*, volume 268, page 359. 2002.

11. Stefan Gottloeber, Anatoly Klypin, Andrey Kravtsov, Yehuda Hoffman, and Andreas Faltenbacher. Simulations of the Local Universe. *arXiv e-prints*, pages astro–ph/0208398, Aug 2002.

12. H. V. von Geramb, A. Funk, and A. Faltenbacher. Nucleon-Nucleon Optical Potentials and Fusion of πN, KN, $\pi\pi$ and NN Systems. *arXiv e-prints*, pages nucl–th/0010057, Oct 2000.