

Prof. Dr. Christoph Pfrommer

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CITIZENSHIP German

POSITIONS **Cosmology Group Leader**, Leibniz-Institut für Astrophysik Potsdam 2017 – present
University Professor, Faculty of Science, Potsdam University

EMPLOYMENT **ERC Group Leader**, *High-Energy Astrophysics and Cosmology*, Heidelberg Institute for Theoretical Studies 2016 – 2017
Senior Research Associate, Heidelberg Institute for Theoretical Studies 2010 – 2016
Senior Research Associate, Canadian Inst. for Theoretical Astrophysics 2008 – 2010
Postdoctoral Fellow, Canadian Institute for Theoretical Astrophysics 2005 – 2008

EDUCATION **Privatdozent (PD)**, Ruprecht-Karls-Universität Heidelberg, Germany Jan 2014
 Venia Legendi in Physics (university teaching credentials)—Habilitation thesis:
Interfacing high-energy astrophysics and cosmological structure formation

Doktor rer. nat., Ludwig-Maximilians-Universität München, Germany Dec 2005
On the role of cosmic rays in clusters of galaxies
 Dr. Enßlin, Prof. Dr. Bartelmann, Prof. Dr. White, Max-Planck Institute for Astrophysics

Physics Diploma, Friedrich-Schiller-Universität Jena, Germany Jul 2002

Diploma Thesis, Max-Planck Institute for Astrophysics, Germany 2001 – 2002
Cosmological weak lensing of the cosmic microwave background by large scale structures
 Prof. Dr. Bartelmann, Prof. Dr. White

Graduate Studies of Physics, Friedrich-Schiller-Universität Jena 2000 – 2001

Graduate Studies of Physics, Harvard University, USA 1999 – 2000
 Graduate School of Arts and Science, Cambridge, Massachusetts

Studies of Physics, Friedrich-Schiller-Universität Jena, Germany 1996 – 1999

VISITING FELLOWSHIPS **Invited Participant** of the program *Gravity’s Loyal Opposition: The Physics of Star Formation Feedback*, Kavli Inst. for Theor. Phys., Santa Barbara, USA Apr – May 2014

Invited Participant of the program *Galaxy Clusters: the Crossroads of Astrophysics and Cosmology*, Kavli Inst. for Theor. Phys., Santa Barbara, USA Feb – Apr 2011

Invited Participant of the program *Particle Acceleration in Astrophysical Plasmas*, Kavli Institute for Theoretical Physics, Santa Barbara, USA Aug – Sep 2009

Visiting Fellow, Stanford University/KIPAC, USA Nov 2007

Visiting Fellow, Max-Planck Institute for Astrophysics, Germany Oct 2007

AWARDS AND GRANTS **ERC Consolidator Grant 2014** with €2 million 2016 – 2021

5yr Kavli Fellowship (declined), Kavli Institute for Cosmology, Cambridge, UK 2010

Scholarship of the *Evangelisches Studienwerk Villigst* Sep 1996 – Jul 2002

TEACHING
EXPERIENCE**PhD Thesis Supervision**

- PhD Student G. Winner, Universität Heidelberg 2016 – 2019
Evolution and observational signatures of relativistic leptons in galaxies
- PhD Student M. Pais, Universität Heidelberg 2016 – 2019
Magnetic field growth in galaxies
- PhD Student F. Zandanel, Universidad de Granada, Spain 2009 – 2012
High-energy phenomena in clusters of galaxies, co-supervision with Dr. Prada
- PhD Student N. Battaglia, University of Toronto, Canada 2006 – 2011
The impact of non-thermal processes in the intracluster medium on cosmological cluster observables, co-supervision with Prof. Dr. Bond
- PhD Student A. Pinzke, Stockholm University, Sweden 2006 – 2010
Gamma-ray emission from galaxy clusters—dark matter and cosmic rays,
co-supervision with Prof. Dr. Bergström

Master Thesis Supervision

- Master Student K. Ehlert, Universität Heidelberg 2016 – 2017
Simulating cosmic ray feedback by active galactic nuclei
- Master Student S. Jacob, Universität Heidelberg 2014 – 2015
Streaming cosmic rays in cool core clusters
- Diploma Student M. Uhlig, Technische Universität München 2011 – 2012
Cosmic-ray driven winds in galaxies, co-supervision with Dr. Enßlin

Teaching Courses

- Cosmology* (14 × 3 hours, master & PhD level)
lectures at Universität Heidelberg 2014/15 and 2013/14
- The Physics of Galaxy Clusters* (14 × 2 hours, master & PhD level)
lectures at Universität Heidelberg 2015/16 and 2012
- Experimental Physics 2* (14 × 2 hours, bachelor level)
tutoring exercise classes at Universität Heidelberg 2013
- High-Energy Astrophysics* (8 × 2 hours, master & PhD level)
lectures jointly taught with Dr. Yan at University of Toronto, 2008
- Introductory Course for Mathematics* (10 × 2 hours, bachelor level)
tutoring exercise classes at Universität Jena 2000/01

Teaching at Summer Schools

- Non-Thermal Processes*, lectures at the summer school *Cosmology with the CMB and Large-Scale Structure* at IUCAA, Pune, India 2008
- Simulating Galaxy Clusters*, review lectures at the *Santa Fe 2007 Cosmology Summer Workshop*, Santa Fe, USA 2007

ACADEMIC
SERVICE**Organizing conferences**

- 11th International Conference on High Energy Density Laboratory Astrophysics*
SLAC National Accelerator Laboratory, Stanford, USA 2016
- Feedback over 44 orders of magnitude: from gamma-rays to the Universe*
Perimeter Institute for Theoretical Physics, Waterloo, Canada 2016
- Groups and Clusters of Galaxies: Confronting Theory with Observations*
International Lorentz Center Workshop, Leiden, Netherlands 2011

Referee for Physical Review Letters, Physical Review D, The Astrophysical Journal, Monthly Notices of the Royal Astronomical Society, Astronomy & Astrophysics, Journal of Cosmology and Astroparticle Physics, New Astronomy, Astrophysics & Space Science, Alexander-von-Humboldt Foundation, Deutsche Forschungsgesellschaft (German Science Association), Science & Technology Facilities Council (UK), New Zealand Marsden Fund

POSITIONS OF TRUST	<p>Member of the Organizing Committee for the Heidelberg Joint Astronomical Colloquium 2012 – 2017</p> <p>Deputy Group Leader Theoretical Astrophysics at HITS 2010 – 2016</p> <p>Responsible for press releases, web related public outreach, and member of the computer committee, CITA 2006 – 2010</p> <p>Student Representative at the MPA and member of the Scientific Institute’s Council 2003 – 2005</p>
RESEARCH INTERESTS	<p>Cosmology. Formation and evolution of galaxies, galaxy clusters, and large-scale structure in the Universe; intergalactic medium and Lyman-α forest; supermassive black holes; cosmological parameter estimation from cluster surveys.</p> <p>High-Energy Astrophysics. Cosmic rays, magnetic fields, and radiative processes in galaxies and galaxy clusters; propagation of ultra-relativistic gamma rays from blazars, pair creation and plasma instabilities; dark matter theory and indirect detection methods.</p> <p>Computational Astrophysics. High-performance computing with the novel unstructured moving mesh code AREPO, the adaptive mesh refinement code FLASH, and the smoothed particle hydrodynamics code GADGET.</p> <p>Radio- and Gamma-Ray Astronomy. Associate member of the LOFAR <i>Magnetism Key Science Project</i>; external collaboration member of the Cherenkov telescopes MAGIC, VERITAS, and the <i>Fermi/LAT Space Telescope Collaboration</i>.</p>
RECENT RESEARCH EXPERIENCE	<p>Group Leader and Senior Research Associate, 2010 – 2017 (selected projects)</p> <p>With my ERC group, R. Pakmor, C. Simpson, and V. Springel, working on code development and studying the <i>effects of cosmic rays and magneto-hydrodynamics on galaxy and cluster formation</i> using the cosmological moving-mesh code AREPO.</p> <p>With A. Broderick, P. Chang, and E. Puchwein, studying the <i>physics of TeV blazar heating</i> and its influence on intergalactic magnetic fields, the extragalactic gamma-ray background, the thermal history of the intergalactic medium, the Lyman-α forest, the formation of dwarf galaxies and thermodynamic structure of galaxy clusters.</p> <p>With M. Vogelsberger, J. Zavala, F.-Y. Cyr-Racine, T. Bringmann, and K. Sigurdson, working on <i>ETHOS – An Effective Theory of Structure Formation</i>: providing an innovative link of dark particle physics to the matter distribution of the Universe.</p> <p>With S. P. Oh, J. Wiener, and A. Pinzke studying the effect of <i>cosmic-ray microphysics</i> on galaxies and non-thermal radio emission in galaxy clusters.</p> <p>With C. Thompson studying the origin of <i>ultra high-energy cosmic rays</i> ($E \simeq 10^{20}$ eV) in the Universe.</p> <p>With N. Battaglia, D. Bond, and J. Sievers, working on <i>galaxy cluster cosmology</i> and studying the effect of cluster physics on X-ray and Sunyaev-Zel’dovich scaling relations, the power spectrum, and cosmological parameter estimation.</p> <p>With A. Pinzke and L. Bergström, working on <i>indirect dark matter detection</i> through high-energy gamma-ray emission from dark matter annihilations and cosmic ray interactions in galaxy clusters.</p> <p>Leading the theoretical interpretation and source modeling for target selection of <i>gamma-ray observations of galaxy clusters</i> with the major observational gamma-ray collaborations <i>Fermi/LAT</i>, MAGIC, and VERITAS.</p>

INVITED
REVIEWS
AND TALKS

- 2016, Dec Galaxy clusters: physics laboratories and cosmology (Cambridge, UK)
- 2016, Dec Workshop on Dynamical effects of cosmic rays (Montpellier, France)
- 2016, Sep Meeting of the German Astronomical Society, review (Bochum, Germany)
- 2016, Jul γ 2016: Symposium on Gamma-Ray Astronomy (Heidelberg, Germany)
- 2016, Jun Workshop on Magnetic Fields in Galaxies (Bochum, Germany)
- 2016, May Computational Galaxy Formation (Ringberg, Germany)
- 2016, Apr Dynamical processes in space plasmas (The Dead Sea, Israel)
- 2016, Mar Feedback over 44 Orders of Magnitude (Perimeter Institute, Canada)
- 2015, Oct Galactic magnetic fields (ISSI Bern, Switzerland)
- 2015, Jul Cosmic magnetic fields (Ringberg Castle, Germany)
- 2015, Jun Intra-cluster medium physics and modelling (MPA Garching, Germany)
- 2015, Jun Nonthermal Processes in Astrophysical Phenomena (Uof Minneapolis, USA)
- 2015, Apr Accelerating Cosmic Ray Comprehension (Princeton University, USA)
- 2014, Nov Astrophysics of High-Beta Plasmas in the Universe (Jeju, Korea)
- 2014, Sep Astroparticle Physics in Germany, review (Karlsruhe, Germany)
- 2014, Aug The Physics of the Intracluster Medium (Copenhagen, Denmark)
- 2014, Jul Inhomogeneities in ICM Plasma, review (Stanford University, USA)
- 2014, Jul Quenching & Quiescence, review (MPIA Heidelberg, Germany)
- 2014, Apr Gravity's Loyal Opposition: Star Formation Feedback (KITP, USA)
- 2014, Mar DPG Conference on Particle Physics, plenary talk (Mainz, Germany)
- 2013, Sep Anisotropic Universe (Amsterdam, The Netherlands)
- 2013, Jun ENIGMA Workshop on the Intergalactic Medium (Heidelberg, Germany)
- 2013, May LOFAR Magnetism Key Science Project Workshop (Sardinia, Italy)
- 2013, Mar SnowCLUSTER conference 2013 (Utah, USA)
- 2013, Mar Rencontres de Moriond: Very High Energy Phenomena, review (Italy)
- 2012, Nov Ringberg Meeting on Galaxy Cluster Cosmology (Germany)
- 2012, Sep Meeting of the German Astronomical Society (Hamburg, Germany)
- 2012, Aug The Physics of the Intracluster Medium (U of Michigan, USA)
- 2012, Aug IAU General Assembly, Magnetic Fields (Beijing, China)
- 2012, Aug IAU General Assembly, High-Energy Gamma-Ray Universe (Beijing, China)
- 2012, Jul DFG Research Unit on Cosmic Magnetization (Mainz, Germany)
- 2012, Feb First Light and Faintest Dwarfs (KITP, USA)
- 2011, Nov LOFAR Magnetism Key Science Project Workshop (Bologna, Italy)
- 2011, Sep Clusters of Galaxies as Cosmic Laboratories (Stockholm, Sweden)
- 2011, Jul Groups and Clusters of Galaxies (Leiden, The Netherlands)
- 2011, Apr Galaxy Clusters: The Crossroads of Astrophys. & Cosmology (KITP, USA)
- 2011, Mar Monsters, Inc: Astrophys. & Cosmology with Galaxy Clusters (KITP, USA)
- 2010, Nov Non-thermal Phenomena in Colliding Galaxy Clusters (Nice, France)
- 2010, Aug The Physics of the Intracluster Medium (U of Michigan, USA)
- 2010, Jun Cosmic Magnetism: From Stellar to Intergalactic Scales (Sydney, Australia)
- 2010, Jun Cosmic Chemical Evolution, review (NASA, Maryland, USA)
- 2010, Jan Clusters of Galaxies as Cosmic Laboratories, review (MIT, USA)
- 2009, Oct Nonlinear Processes in Astrophysical Plasmas (KITP, USA)
- 2009, Sep Particle Acceleration in Astrophysical Plasmas (KITP, USA)
- 2009, Apr The Future of Cluster Cosmology (Perimeter Institute, Canada)
- 2009, Mar CIFAR Cosmology and Gravity Programme (Mont-Tremblant, Canada)
- 2009, Feb High-Energy Phenomena in Galaxy Clusters, review (Granada, Spain)
- 2008, Dec 24th Texas Symposium, plenary review (Vancouver, Canada)
- 2008, Aug Cosmology with the CMB and LSS, lectures and review talk (Pune, India)
- 2008, Jul COSPAR Scientific Assembly, review (Montreal, Canada)
- 2007, Sep Cosmic Matter 2007, review (Würzburg, Germany)
- 2007, Jul Santa Fe 2007 Cosmology Summer Workshop, review (Santa Fe, USA)

SEMINARS AND COLLOQUIA	2016, Nov	Physics Colloquium & Joint Astronomical Seminar, Innsbruck (Austria)
	2016, Jul	Heidelberg Joint Astronomical Colloquium (Germany)
	2016, Mar	Astro Seminar, University of Waterloo (Canada)
	2015, Oct	Colloquium, Max-Planck Institute for Radioastronomy (Germany)
	2015, May	Astrophysics Seminar, Weizmann Institute (Israel)
	2015, May	Astrophysics Seminar, Ben Gurion University (Israel)
	2015, May	Colloquium, University of Erlangen/Nürnberg (Germany)
	2015, Apr	Cosmology & Fluids Seminars, CITA, Toronto (Canada)
	2015, Apr	Cosmology Seminar, Perimeter Institute, Waterloo (Canada)
	2015, Feb	Astronomy Colloquium, University of Wisconsin, Madison (USA)
	2014, Jul	Astrophysics Seminar, Würzburg Universität (Germany)
	2014, Jan	Königstuhl Colloquium, Heidelberg Universität (Germany)
	2013, Dec	Theory Seminar, Max-Planck Institute for Astronomy (Germany)
	2013, Sep	GRAPPA Seminar, University of Amsterdam (The Netherlands)
	2013, Feb	Astrophysics Symposium, Heidelberg Universität (Germany)
	2012, Oct	Physics Colloquium, Ruhr Universität Bochum (Germany)
	2012, Oct	Astrophysics Seminar, Ruhr Universität Bochum (Germany)
	2012, Jan	Astrophysics Colloquium, Universität Göttingen (Germany)
	2012, Jan	Astroparticle Physics Seminar, Universität Hamburg/DESY (Germany)
	2011, Nov	Colloquium, Max-Planck Institute for Astronomy (Germany)
	2011, Nov	Cosmology Seminar, Max-Planck Institute for Astrophysics (Germany)
	2011, Oct	Colloquium, Max-Planck Institute for Radioastronomy (Germany)
	2011, Apr	Astrophysics Colloquium, Stanford University/KIPAC (USA)
	2011, Apr	Cosmology Seminar, U of California, Santa Cruz (USA)
	2011, Apr	TAPIR Seminar, California Institute of Technology (USA)
	2011, Feb	Astrophysics Seminar, Max-Planck Institute for Nuclear Physics (Germany)
	2011, Feb	Scientific Seminar, Heidelberg Institute for Theoretical Studies (Germany)
	2011, Jan	Symposium of the Max-Planck Society, Düsseldorf (Germany)
	2010, Sep	Oskar Klein Centre Seminar, Stockholm University (Sweden)
	2010, May	Astrophysics Seminar, Institute for Advanced Study, Princeton (USA)
	2010, Apr	Physics Colloquium, Universität Basel (Switzerland)
	2010, Jan	Seminar, Cambridge University/Kavli Institute for Cosmology (UK)
	2010, Jan	Physics Colloquium, Würzburg University (Germany)
	2009, Nov	Colloquium, McMaster University (Canada)
	2009, Nov	Colloquium, Max-Planck Institute for Astrophysics (Germany)
	2009, Jun	Colloquium, Universitäts-Sternwarte München (Germany)
	2009, Feb	Colloquium, Leiden Observatory (The Netherlands)
	2008, Nov	Astrophysics/Cosmology Lunch, Princeton University (USA)
	2008, Nov	Seminar, University of Toronto (Canada)
	2008, Oct	Seminar, Purdue University (USA)
	2008, Apr	Seminar, McMaster University (Canada)
	2008, Mar	Astro Lunch Talk, University of Waterloo (Canada)
2007, Nov	TAPIR Seminar, California Institute of Technology (USA)	
2007, Nov	Astrophysics Seminar, Los Alamos National Laboratory (USA)	
2007, Nov	Theory Lunch Seminar, University of California, Berkeley (USA)	
2007, Oct	ACKS Seminar, Stanford University/KIPAC (USA)	
2007, Oct	High-Energy Seminar, Max-Planck-Institute for Astrophysics (Germany)	
2007, Sep	CoPS Seminar, Stockholm University (Sweden)	
2007, Feb	Astrophysics Seminar, Carnegie Mellon University (USA)	
2006, Apr	Colloquium, University of Victoria (Canada)	
2006, Mar	Colloquium, University of British Columbia (Canada)	
2005, Apr	Astrophysics Seminar, Universität Würzburg (Germany)	