

Philipp Girichidis

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August 2018

EDUCATION/POSITIONS

Postdoc Positions

Aug. 2017 – present, Leibniz-Institut für Astrophysik (AIP), Potsdam, Germany
Sep. 2016 – Jul. 2017, Heidelberg Institute for Theoretical Studies, Heidelberg, Germany
Apr. 2012 – Aug. 2016, Max Planck Institute for Astrophysics, Garching, Germany

Doctoral Studies

May 2011 – Mar. 2012, PhD position, Hamburger Sternwarte, Germany
Dec. 2010 – Apr. 2011, PhD position, University of Heidelberg, Germany
Apr. 2010 – Nov. 2010, CONSTELLATION fellowship, Cardiff University, Cardiff, UK
Jan. 2009 – Mar. 2010, PhD position at University of Heidelberg, Germany

Undergraduate and Graduate Studies

Aug. 2007 – Dec. 2008, Study of physics (Diplom/M. Sc.), Michigan State University, Lansing, USA
Apr. 2003 – Aug. 2007, Study of physics (Diplom), University of Heidelberg, Germany

RESEARCH INTERESTS

- Dynamical impact of cosmic rays in the interstellar medium
- Supernova feedback in molecular clouds
- Impact of magnetic fields on turbulent dynamics
- Chemical evolution in the interstellar medium
- Numerical simulations of turbulence
- Present-day star formation

PUBLICATIONS

First author publications:

1. *The SILCC project - V. The impact of magnetic fields on the chemistry and the formation of molecular clouds*
Philipp Girichidis, Daniel Seifried, Thorsten Naab, Thomas Peters, Stefanie Walch, Richard Wunsch, Simon C. O. Glover, Ralf S. Klessen
 Monthly Notices of the Royal Astronomical Society, 480, 3511 (2018)
2. *Cooler and smoother – the impact of cosmic rays on the phase structure of galactic outflows*
Philipp Girichidis, Thorsten Naab, Michał Hanasz, Stefanie Walch
 Monthly Notices of the Royal Astronomical Society, 479, 3042 (2018)
3. *The SILCC (SIMulating the LifeCycle of molecular Clouds) project - II. Dynamical evolution of the supernova-driven ISM and the launching of outflows*
Philipp Girichidis, Stefanie Walch, Thorsten Naab, Andrea Gatto, Richard Wunsch, Simon C. O. Glover, Ralf S. Klessen, Paul C. Clark +3 co-authors
 Monthly Notices of the Royal Astronomical Society, 456, 3432 (2016)
4. *Launching cosmic-ray-driven outflows from the magnetized interstellar medium*
Philipp Girichidis, Thorsten Naab, Stefanie Walch, Michał Hanasz, Mordecai-Mark Mac Low, Jeremiah P. Ostriker, Andrea Gatto, Thomas Peters +5 co-authors
 The Astrophysical Journal, 816, L19 (2016)
5. *Anisotropic transport and early dynamical impact of Cosmic Rays around Supernova remnants*
Philipp Girichidis, Thorsten Naab, Stefanie Walch, Michał Hanasz
 [arXiv:1406.4861]
6. *On the evolution of the density pdf in strongly self-gravitating systems*
Philipp Girichidis, Lukas Konstandin, Anthony P. Whitworth, Ralf S. Klessen
 The Astrophysical Journal, 781, 91 (2014)
7. *Importance of the Initial Conditions for Star Formation - III: Statistical Properties of Embedded Protostellar Clusters*
Philipp Girichidis, Christoph Federrath, Richard Allison, Robi Banerjee, Ralf Klessen
 Monthly Notices of the Royal Astronomical Society, 420, 3264 (2012)
8. *Importance of the Initial Conditions for Star Formation - II. Fragmentation Induced Starvation and Accretion Shielding*
Philipp Girichidis, Christoph Federrath, Robi Banerjee, Ralf S. Klessen
 Monthly Notices of the Royal Astronomical Society, 420, 613 (2012)
9. *Importance of the Initial Conditions for Star Formation - I. Cloud Evolution and Morphology*
Philipp Girichidis, Christoph Federrath, Robi Banerjee, Ralf S. Klessen
 Monthly Notices of the Royal Astronomical Society, 413, 2741 (2011)

Further publications:

1. *The imprint of cosmic ray driven outflow on Lyman-alpha spectra*
 Max Gronke, **Philipp Girichidis**, Thorsten Naab, Stefanie Walch
 The Astrophysical Journal, 862, L7 (2018)
2. *Radiative transfer calculations of the diffuse ionised gas in disc galaxies with cosmic ray feedback*

- Bert Vandenbroucke, Kenneth Wood, **Philipp Girichidis**, Alex Hill, Thomas Peters
 Monthly Notices of the Royal Astronomical Society, 476, 4032 (2018)
3. *Is molecular cloud turbulence driven by external supernova explosions?*
 D. Seifried, S. Walch, S. Haid, **P. Girichidis**, T. Naab
 The Astrophysical Journal, 855, 81 (2018)
 4. *SILCC-Zoom: The dynamical and chemical evolution of molecular clouds*
 D. Seifried, S. Walch, **P. Girichidis**, T. Naab, R. Wünsch, R. S. Klessen, S. C. O. Glover, T. Peters +1 co-author
 Monthly Notices of the Royal Astronomical Society, 472, 4797 (2017)
 5. *The turbulent life of dust grains in the supernova-driven, multi-phase interstellar medium*
 Thomas Peters, Svitlana Zhukovska, Thorsten Naab, **Philipp Girichidis**, Stefanie Walch, Simon C. O. Glover, Ralf S. Klessen, Paul C. Clark +1 co-author
 Monthly Notices of the Royal Astronomical Society, 467, 4322 (2017)
 6. *The SILCC project — IV. Impact of dissociating and ionising radiation on the interstellar medium and H α emission as a tracer of the star formation rate*
 Thomas Peters, Thorsten Naab, Stefanie Walch, Simon C. O. Glover, **Philipp Girichidis**, Eric Pellegrini, Ralf S. Klessen, Richard Wünsch +2 co-authors
 Monthly Notices of the Royal Astronomical Society, 466, 3293 (2017)
 7. *The SILCC project: III. Regulation of star formation and outflows by stellar winds and supernovae*
 A. Gatto, S. Walch, T. Naab, **P. Girichidis**, R. Wünsch, S. C. O. Glover, R. S. Klessen, P. C. Clark +4 co-authors
 Monthly Notices of the Royal Astronomical Society, 466, 1903 (2017)
 8. *The impact of magnetic fields on the chemical evolution of the supernova-driven ISM*
 Anabele-Linda Pardi, **Philipp Girichidis**, Thorsten Naab, Stefanie Walch, Thomas Peters, Fabian Heitsch, Simon C. O. Glover, Ralf S. Klessen +2 co-authors
 Monthly Notices of the Royal Astronomical Society, 465, 4611 (2017)
 9. *Mach number study of supersonic turbulence: The properties of the density field*
 Lukas Konstandin, Wolfram Schmidt, **Philipp Girichidis**, Thomas Peters, Rahul Shetty, Ralf S. Klessen
 Monthly Notices of the Royal Astronomical Society, 460, 4483 (2016)
 10. *Impact of supernova and cosmic-ray driving on the surface brightness of the galactic halo in soft X-rays*
 Thomas Peters, **Philipp Girichidis**, Andrea Gatto, Thorsten Naab, Stefanie Walch, Richard Wünsch, Simon C. O. Glover, Paul C. Clark +2 co-authors
 The Astrophysical Journal, 813, L27 (2015)
 11. *Detection of two power-law tails in the probability distribution functions of massive GMCs*
 N. Schneider, S. Bontemps, **P. Girichidis**, T. Rayner, F. Motte, P. Andre, D. Russeil, A. Abergel +15 co-authors
 Monthly Notices of the Royal Astronomical Society, 453, L41 (2015)
 12. *The SILCC (SIMulating the LifeCycle of molecular Clouds) project: I. Chemical evolution of the supernova-driven ISM*
 S. K. Walch, **P. Girichidis**, T. Naab, A. Gatto, S. C. O. Glover, R. Wünsch, R. S. Klessen, P. C. Clark +2 co-authors
 Monthly Notices of the Royal Astronomical Society, 454, 238 (2015)
 13. *Modelling the supernova-driven ISM in different environments*
 A. Gatto, S. Walch, M. -M. Mac Low, T. Naab, **P. Girichidis**, S. C. O. Glover,

- R. Wünsch, R. S. Klessen +6 co-authors
Monthly Notices of the Royal Astronomical Society, 449, 1057 (2015)
14. *Understanding star formation in molecular clouds I. Effects of line-of-sight contamination on the column density structure*
N. Schneider, V. Ossenkopf, T. Csengeri, R. Klessen, C. Federrath, P. Tremblin, **P. Girichidis**, S. Bontemps +1 co-author
Astronomy and Astrophysics, 575, A79 (2015)
 15. *Turbulence in Giant Molecular Clouds: The effect of photoionisation feedback*
D. M. Boneberg, J. E. Dale, **P. Girichidis**, B. Ercolano
Monthly Notices of the Royal Astronomical Society, 447, 1341 (2015)
 16. *Hierarchical Bayesian analysis of the velocity power spectrum in supersonic turbulence*
Lukas Konstandin, Rahul Shetty, **Philipp Girichidis**, Ralf S. Klessen
Monthly Notices of the Royal Astronomical Society, 446, 1775 (2015)
 17. *A new density variance - Mach number relation for subsonic and supersonic, isothermal turbulence*
Lukas Konstandin, **Philipp Girichidis**, Christoph Federrath, Ralf S. Klessen
The Astrophysical Journal, 761, 149 (2012)
 18. *The influence of the turbulent perturbation scale on prestellar core fragmentation and disk formation*
S. Walch, A. P. Whitworth, **P. Girichidis**
Monthly Notices of the Royal Astronomical Society, 419, 760 (2012)

INVITED TALKS

COSMIC RAYS – The salt of the star formation recipe, Florence, Italy, May 2nd, 2018

Dynamical and chemical impact of CRs on the ISM

Max Planck Princeton Center Workshop 2018, Princeton, NJ, USA, April 24, 2018

The role of CRs in shaping the ISM and launching outflows

Numerical Galaxy Formation, Schloss Ringberg, Tegernsee, Germany, March 21, 2018

The role of CRs in shaping the ISM and launching outflows

Bayesian Magnetic Fields, Lorentz Center, Leiden, Netherlands, March 23, 2017

Dynamical impact of CRs on the structure of the ISM

Stellar aggregates over mass and spatial scales, Bad Honnef, Germany, December 6, 2016

Importance of the initial conditions for star and star cluster formation

COSMIDYN workshop, Montpellier, France, December 1st, 2016

Cosmic ray-driven outflows from the ISM

MPA-USW conference, Cape Town, South Africa, November 22, 2016

How CRs help driving outflows

SFB seminar, Cologne, Germany, June 20, 2016

Dynamical impact of CRs in the ISM and the launching of outflows

Numerical Galaxy Formation, Ringberg, Tegernsee, Germany, May 9, 2016

Dynamical impact of CRs in the ISM and the launching of outflows

Hamburger Sternwarte, Institute colloquium, Hamburg, Germany, November 14, 2014

Dynamical impact of cosmic rays on the ISM and Galactic Outflows

Gas and Stars in Galaxies, Ringberg, Germany, May 12, 2014

Dynamical impact of cosmic rays on the ISM and Galactic Outflows

Annual Meeting of DFG Research Unit FOR 1254, Rügheim, Germany, October 1st, 2013

Effect of cosmic rays on the ISM and galaxy evolution

University of Sofia, Sofia, Bulgaria, October 2011

Oct. 4: Key aspects of present-day star formation

Oct. 5: Star formation now and in the early universe

Oct. 6: Numerical techniques in computational astrophysics

Hamburger Sternwarte, Institute colloquium, Hamburg, Germany, June 23, 2011

Importance of the Initial Conditions for Star Formation

OWN INTERNATIONAL MEETINGS

2018: **Workshop on astrophysical shocks**

March 5-7, 2018, AIP, Potsdam, Germany

2016: **The ISM-SPP Olympian School of Astrophysics 2016**, co-organiser
October 3-7 2016, Paralia Katerinis, Greece

TALKS AT CONFERENCES & WORKSHOPS

CRISM – Cosmic rays in the ISM, Grenoble, France, June 25, 2018
Cooler and smoother –The impact of the phase structure of galactic outflows

Shocks2018, AIP Potsdam, Germany, March 6, 2018
The role of cosmic rays in the interstellar medium

ISM day, Hamburger Sternwarte, Hamburg, Germany, February 6, 2018
The role of cosmic rays in the interstellar medium

ISM-SPP Conference, Cologne, Germany, March 13, 2017
Dynamical impact of CRs on the structure of the ISM

Shocks2016, Torun, Poland, September 14, 2016
Shock structure of the multiphase ISM in Cosmic-Ray-MHD simulations

ASTRONUM, Monterey, California, USA, June 7, 2016
Dynamical impact of CRs in the ISM and the launching of outflows

Local Gas conference, ASTRON, Dwingeloo, Netherlands, August 31, 2015
Chemical and dynamical evolution of the SN-driven ISM and the launching of outflows

Star Formation History of the Universe, Munich Institute for Astro- and Particle Physics (MIAPP), Garching, Germany, August 10, 2015
The impact of cosmic rays on the ISM and outflows

Kavli Institute, The Physics of Star Formation Feedback, Santa Barbara, USA, July 2nd, 2014
Dynamical impact of cosmic rays on the ISM

The Olympian Symposium on Star Formation, Katerini, Greece, May 26, 2014
Dynamical impact of cosmic rays on the ISM

Physical processes in the ISM, Garching, Germany, October 25, 2013
CRs in the ISM and the evolution of CR spectra

The Labyrinth of Star Formation, Krete, Greece, June 19, 2012
Impact of small-scale tangled magnetic fields on star formation

Annual Meeting of the Astronomische Gesellschaft, Heidelberg, Germany, September 22, 2011
Energetics, Substructure and Mass Segregation in Dense Clusters

Advances in Computational Astrophysics, Cefalu, Italy, June 14, 2011
Importance of the initial conditions for star formation

Zeus et al., Symposium on Numerical Star Formation, Katerini, Greece, July 5, 2010
Numerical Simulations of Gravo-turbulent Collapse

Workshop on SPH and AMR Simulations of Astrophysical Processes, Ober-

gurgl, Austria, May 2010
Gravoturbulent Fragmentation with FLASH

SUPERVISION

2017 - present: Georg Winner, PhD student, co-supervision
2017 - present: Maria Werhahn, Master student, co-supervision
2013 - 2017: Anabele Pardi, PhD student
2012 - 2016: Andrea Gatto, PhD student, co-supervision
2015 - 2016: Mattia Straccia, Master student
2015: Adrian Bittner, Bachelor student
2014: Alexander Nieddu, practical semester
2014: Marco Michel, Bachelor student
2014: Franziska Schmidt, practical semester
2013: Sebastian Hutschenreuter, Bachelor student

TEACHING

2018-2019: Lecture *Modern Computational Astrophysics*
winter term 2018-2019, University of Potsdam, together with Christoph Pfrommer
Master Physik Modul 731, 732
Master Astrophysics Modul PHY-755
and
Master Physik Modul 731, 732
Master Astrophysics Modul PHY-765
2016: Practical course on numerical hydrodynamics
The ISM-SPP Olympian School of Astrophysics 2016, October 2016, Paralia Katerinis,
Greece
2010: Tutorial in numerical mathematics
2009: Tutorial in computational physics
2005 - 2006: Introduction to Sequences and Series for students in mathematics
2004 - 2007: Introduction to Complex Numbers for students in mathematics

COMMITTEES

Postdoc Representative

- 2014 - 2016: Postdoc representative at MPA, Garching

General Student Representative, University of Heidelberg

- 2006 - 2007: Chair of General Student Representation (Allgemeiner Studierendenausschuss)

Student Representative in Physics/Mathematics, University of Heidelberg

- 2004 - 2007: Member of Fakultätsrat
- 2004 - 2007: Member of Studienkommission
- 2006 - 2007: Member of Gebührenkommission

PROFESSIONAL AFFILIATIONS

Deutsche Physikalische Gesellschaft

SKILLS

Computing

- Programming: FORTRAN, C/C++, Python, php, HTML, MPI, OpenMP
- Cluster Computer: JUGENE, CASPUR, KOLOB, SuperMUC, computers at MPCDF in Garching (HYDRA, ODIN, FREYA, COBRA), computers at HITS in Heidelberg (BRIDGE, HASWELL), computers at AIP in Potsdam (LEIBNIZ, NEWTON)

Language ability

- German, Native speaker
- English, Fluent in spoken and written
- French, Good in spoken