
Rowan J. Smith

Curriculum Vitae

Institut für Theoretische Astrophysik
Zentrum für Astronomie der Universität Heidelberg
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date of birth: 22nd August 1984, place of birth: Bellshill, Scotland



Employment

- *Oct 2009 – present*
Postdoctoral Researcher ITA, Zentrum für Astronomie der Universität Heidelberg

Education

- *Sept. 2006 – Sept. 2009*
Ph.D. in Astrophysics University of St. Andrews, Scotland
'The Earliest Fragmentation in Molecular Clouds and its relationship to Star Formation'
Supervisor: Prof. Dr. Ian Bonnell
Awarded: June 2010
- *Sept. 2002 – June. 2006*
MPhys in Astrophysics - First Class University of St. Andrews, Scotland
Accelerated 'Direct Entry' Program
Masters Project: 'A New Model For Cold Dark Matter Halos'
- *Aug. 2000. – May. 2002*
Higher (A×6), Advanced Higher (A×3) Coltness High School

Awards and Fellowships

- *2014* Awarded RAS Norman Lockyer Fellowship (awarded to one promising young researcher by the Royal Astronomical Society every three years).
- *2011* I proposed and was awarded funding for my own three year research position from the German Science Foundation under the DFG Priority Program 1573: 'Physics of the Interstellar Medium'.
- *2009* Two year 'Frontier Grant' from the University of Heidelberg Excellence Initiative.
- *2006* Three year PPARC funded Ph.D position at the University of St-Andrews.
- *2005* Carnegie Trust grant for a summer project simulating observations of T-Tauri disks at the Observatory of Bordeaux, under the supervision of Dr. Anne Dutrey.
- *2004* Cormack Scholarship for a summer project studying SPH simulations of supernovae with Prof. Ian Bonnell at the University of St-Andrews.

- *Medals* As an undergraduate I received the class medals for 1st to 5th Level Astrophysics, 2nd level Mathematical Methods, 2nd level Physics, and the prize for the best physics talk of my year.
- *Professional Bodies* Fellow of the Royal Astronomical Society, Member of the SFB 881.

Skills

Personal Statement

My research focusses on the birth of stars from the beginning of time to the present day. My approach to this problem is to perform cutting-edge numerical simulations that can be used to test the underlying physical processes. Highlights of my research have included work showing that massive star-formation is a natural by-product of the formation of dense clusters, and my publications showing that that the first (Population III) stars did not form in isolation but in multiple systems. I have an international group of collaborators from Europe, the USA, and Japan and I am always on the lookout for research opportunities outside my previous comfort zone, such as in my recent publication studying the role of dark matter annihilation in Population III star-formation. Having developed this numerical expertise I am now seeking to unite theories and observations of star-formation, by making clear observational predictions, as in my recent publication outlining the observable signatures expected from my model of star forming cores. To facilitate this I have developed strong collaborations with observers and have been co-I on many observing proposals lead by scientists from institutions outside my own.

Since the award of my Ph.D from the University of St. Andrews in 2010 I have pursued an independent research career in Germany. At the University of Heidelberg I was first the recipient of a Frontier Grant from the university's Excellence Initiative, and following this I applied for funding from the DFG (German Science Foundation) priority program 'The Physics of the Interstellar Medium'. My research proposal was successful and I was made P.I. of my own three year research project (worth 204,960 euros) at Heidelberg studying Infrared Dark Cloud (IRDC) formation. In 2014 I was awarded the prestigious Norman Lockyer Fellowship by the RAS which I will take to the Jodrell Bank Centre for Astrophysics later this year. I have 21 refereed publications in high quality peer-reviewed journals such as MNRAS and ApJ, eleven of which are first author, as well as conference review articles. These have a total of 672 citations and an h-index of 12. I was also a member of a high profile international collaboration on First Star formation, the lead paper of which was published in Science.

Computational Experience

1. Programming Languages: C, Fortran77, Fortran90, IDL
2. Astronomical Software:
Computational Fluid Dynamics - SPHNG (Bate,M. 2005), GADGET2, AREPO
Computational Radiative Transfer - RADMC-3D
3. Operating Systems: Unix, Linux, Windows, Mac OSX

Teaching

2012–present	Supervision of Masters and Bachelors Students	ITA Heidelberg
2013–2014	Co-lecturer and author of Masters level course 'The Physics of the ISM'	ITA Heidelberg
2007–2009	Introductory lecturer for visiting high school students	University of St-Andrews
2006–2009	Tutor in level 2 Astrophysics	University of St-Andrews
2007–2008	Tutor for Physical Universe course	University of St-Andrews
2006–2007	Lab demonstrator for level 1 Astrophysics	University of St-Andrews

Public Outreach

2007–2009	Traveling Schools Planetarium presenter	University of St-Andrews
2006–2007	Dark Sky Scotland presenter	Scottish Tourist Board

Organisational Skills

July 2012	Conference LOC member and Abstract Book, 'Galactic Scale Star Formation',	ITA Heidelberg
2009–2012	Institute colloquium co-ordinator	ITA Heidelberg
July 2008	Conference LOC member and Abstract Book, 'Cool Stars XV'	University of St. Andrews
2006–2008	Postgraduate Rep. student staff council.	University of St. Andrews
2002–2006	Secretary and then President of student astronomy society.	University of St. Andrews

Recent Talks

July 2014	Invited key-note speaker for upcoming AAS meeting on Dense Cores
June 2014	"Exploring the filamentary initial conditions of star formation using Arepo, EPOS 2014, Ringberg, Germany
May 2014	"Exploring the filamentary initial conditions of star formation using Arepo, Olympian Symposium on Star Formation, Greece
February 2014	"Studying Galactic Scale Star Formation with Arepo, IGSSF 2014, Sapporo, Japan
October 2013	"Filamentary Structures in the ISM", Physical Processes in the ISM, Garching
May 2013	Invited to Aspen Centre for Physics where I lead discussion sessions on Cluster Formation and Observational Comparisons
February 2013	"Line profile observations of simulated star formation." CFA Harvard

Other

Full, current and clean UK driving licence.

References

Prof. Dr. Ralf Klessen Institut für Theoretische Astrophysik Universität Heidelberg Albert-Ueberle-Straße 2 69120 Heidelberg, Germany	<i>Phone:</i> +49-6221-54-8978 <i>Fax:</i> +49-6221-54-4221 <i>E-mail:</i> klessen@uni-heidelberg.de
Prof. Dr. Ian Bonnell School of Physics & Astronomy University of St Andrews North Haugh St Andrews, KY16 9SS Scotland	<i>Phone:</i> +44-1334-54-3140 <i>Fax:</i> +44-1334-54-3104 <i>E-mail:</i> iab1@st-andrews.ac.uk
Dr. Simon Glover Institut für Theoretische Astrophysik Universität Heidelberg Albert-Ueberle-Straße 2 69120 Heidelberg, Germany	<i>Phone:</i> +49-6221-54-4206 <i>Fax:</i> +49-6221-54-4221 <i>E-mail:</i> glover@uni-heidelberg.de

Full Publication List

Publications

Total Publications: 28, Total Citations: 677, h-index: 12

1. Peters, T., Schleicher, D.R.G., **Smith, R.J.**, Schmidt, W., Klessen, R.S. 2014. Low-metallicity star formation: Relative impact of metals and magnetic fields. *MNRAS*, in press.
2. **Smith, R.J.**, Glover, S.C.O, Clark, P.C., Klessen, R.S., Springel, V. 2014. CO-dark gas and molecular filaments in Milky Way type galaxies. *MNRAS* 441, 1628.
3. Chira R-A, **Smith, R.J.**, Klessen, R.S., Stutz, A.M., Shetty, R. 2014. Line Profiles of Cores within Clusters. III. What is the most reliable tracer of core collapse in dense clusters?. *MNRAS*, submitted. arXiv:1402.5279
4. **Smith, R.J.**, Shetty, R., Beuther, H., Klessen, R., & Bonnell, I.A. 2013. Line Profiles of Cores within Clusters: II Signatures of Dynamical Collapse during High Mass Star Formation. *ApJ* 771, 24.
5. Zernickel, A., Schilke, P., **Smith, R.J.** 2013. The global velocity field of the filament in NGC 6334*. *A&A* 554, L2.
6. Beuther, H., Linz, H., Tackenberg, J., Henning, Th., Krause, O., Ragan, R., Nielbock, M., Launhardt, R., Bühr, S., Schmiedeke, A., Schuller, F., & **Smith, R.J.** 2013. Fragmentation and dynamical collapse of the starless high-mass star-forming region IRDC18310-4. *A&A* 553, 115.
7. Walker-Smith S.L., Richer J.S., Buckle J.V., **Smith, R.J.**, Greaves J.S., & Bonnell I.A. 2013. The structure and kinematics of dense gas in NGC 2068. *MNRAS* 429, 3252.
8. Bonnell, I.A., Dobbs, C.A. & **Smith, R.J.** 2013. Shocks, cooling and the origin of star formation rates in spiral galaxies. *MNRAS* 430, 1790.
9. **Smith, R.J.**, Iocco, F., Schleicher, D., Glover, S.C.O, Klessen, R.S., Hirano, S., & Yoshida, N. 2012. WIMP DM and first stars: suppression of fragmentation in primordial star formation. *ApJ* 761, 3252.
10. Peters, T., Schleicher, D. R. G., Klessen, R. S., Banerjee, R., Federrath, C., **Smith, R. J.**, & Sur, S. 2012. The impact of thermodynamics on gravitational collapse: filament formation and magnetic field amplification. *ApJL* 760, 28.
11. **Smith, R.J.**, Shetty, R., Stutz, A. & Klessen, R. 2012. Line Profiles of Cores within Clusters: I. The Anatomy of a Filament. *ApJ* 750, 64.
12. **Smith, R.J.**, Hosokawa, T., Omukai, K.; Glover, S. C. O. & Klessen, R. S. 2012. Variable Accretion Rates and Fluffy First Stars. *MNRAS* 424, 457.
13. Greif, T.H., Bromm, V., Clark, P.C., Glover, S.C.O., **Smith, R.J.**, Klessen, R.S. & Bromm, V., Yoshida, N., Springel, V. 2012. Formation and evolution of primordial protostellar systems. *MNRAS* 424, 399.
14. **Smith, R.J.**, Glover, S.C.O., Clark, P.C., Greif, T.H. & Klessen, R.S. 2011. The Effects of Accretion Luminosity upon Fragmentation in the Early Universe. *MNRAS* 414, 3633.
15. Greif, T.H., Springel, V., White, S.D.H., Glover, S.C.O., Clark, P.C., **Smith, R.J.**, Klessen, R.S. & Bromm, V. 2011. Simulations on a Moving Mesh: The Clustered Formation of Population III Protostars. *ApJ* 737, 75.
16. Clark, P.C., Glover, S.C.O., **Smith, R.J.**, Greif, T.H., Klessen, R.S. & Bromm, V. 2011. The Formation and Fragmentation of Disks around Primordial Protostars. *Science* 331, 1040.
17. **Smith, R.J.**, Glover, S.C.O., Bonnell, I.A., Clark, P.C., & Klessen, R.S. 2011. A quantification of the non-spherical geometry and accretion of collapsing cores. *MNRAS* 411, 1354-1366.
18. Dale, J.E., Wunsch, R., **Smith, R.J.**, Whitworth, A., & Palous, J, 2011,. The fragmentation of expanding shells III: Oligarchic accretion and the mass spectrum of fragments. *MNRAS* 411, 2230-2240.

19. Bonnell, I.A., **Smith, R.J.**, Clark, P.C. & Bate, M.R. 2011. The efficiency of star formation in clustered and distributed regions. *MNRAS* 410, 2339-2346.
20. **Smith, R.J.**, Longmore, S. & Bonnell, I.A. 2009. The simultaneous formation of massive stars and stellar clusters . *MNRAS* 400, 1775-1784.
21. **Smith, R.J.**, Clark, P.C. & Bonnell, I.A. 2009. Fragmentation in molecular clouds and its connection to the IMF . *MNRAS* 396, 830-841.
22. **Smith, R.J.**, Clark, P.C., Bonnell, I.A. 2008. The structure of molecular clouds and the universality of the clump mass function . *MNRAS* 391, 1091-1099.
23. Greif, T.H., Bromm, V., Clark, P.C., Glover, S.C.O., **Smith, R.J.**, Klessen, R.S. & Bromm, V., Yoshida, N., Springel, V., 2012, "Formation and evolution of primordial protostellar systems" *FIRST STARS IV - From Hayashi to the future* -. *AIP Conference Proceedings* Volume 1480, pp. 51-56
24. **Smith, R.J.**, Glover, S.C.O., Clark, P.C., Greif, T.H. & Klessen, R.S., 2011, "The effects of accretion luminosity from Pop III protostars", *Proceedings of Cosmic Radiation Fields: Sources in the early Universe - CRF2010*, in press
25. **Smith, R.J.**, Clark, P.C, Glover, S.C.O, Bonnell, I.A., & Klessen, R.S., 2010, "The Effect of Environment on Massive Star Formation" ,*Proceedings of UP2010, Have Observations Revealed a Variable Upper End of the Initial Mass Function?*, see arXiv1008.4932
26. Bonnell, I.A. & **Smith, R.J.**, 2010, "The Formation of Massive Stars" , *Proceedings of IAU Symposium No. 270* in press
27. Clark, P., Glover, S.C.O., **Smith, R.J.**, Greif, T.H., Klessen, R.S., & Bromm, V., 2010 "The Formation and Fragmentation of Primordial Protostellar Discs" , *Proceedings of The First Stars and Galaxies: Challenges for the Next Decade*, see <http://adsabs.harvard.edu/abs/2010AIPC.1294..52C>
28. **Smith, R.J.**, Clark, P.C., Glover, S.C.O. & Klessen, R.S., 2010, "The Effects of Accretion Luminosity on the Environment of the First Stars" , *Proceedings of The First Stars and Galaxies: Challenges for the Next Decade*, see <http://adsabs.harvard.edu/abs/2010AIPC.1294..285S>