

# Helen Kirk

Herzberg Astrophysics, National Research Council of Canada

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Current Position	Research Associate, National Research Council of Canada	Aug 2013 - present
Previous Positions	Banting Fellow, McMaster University Advisor: Ralph Pudritz	Sept 2012 - Aug 2013
	SAO Postdoctoral Fellow, Harvard Smithsonian Center for Astrophysics Advisor: Phil Myers	Sept 2011 - Aug 2012
	NSERC Postdoctoral Fellow, Harvard Smithsonian Center for Astrophysics Advisor: Phil Myers	Sept 2009 - Aug 2011
Education	PhD in Astronomy, University of Victoria: <i>Star Formation in the Perseus Molecular Cloud: Observations of Dynamics and Comparison to Simulations</i> Advisor: Doug Johnstone	Sept 2005 - Aug 2009
	MSc in Astronomy, University of Victoria: <i>Understanding Star Formation in the Perseus Molecular Cloud</i> Advisor: Doug Johnstone	Sept 2003 - Aug 2005
	HonBSc in Physics and Astronomy, University of Toronto: <i>The Generation of Synthetic Galaxy Images</i> Advisor: Bob Abraham	Sept 1999 - Aug 2003
Scholarships & Awards	Plaskett Medal (best Canadian astronomy PhD thesis in the past two years)	Mar 2009
	University of Victoria Fellowship	2005-2006, 2008-2009
	Natural Sciences and Eng. Research Council of Canada (NSERC) CGS-D Award	Sept 2006 - Aug 2008
	Petrie Fellowship	Sept 2005 - Aug 2006
	National Research Council of Canada GSSSP	Sept 2004 - Aug 2008
	NSERC PGS-A Award	Sept 2003 - Aug 2005
University of Victoria President's Award	Sept 2003 - Aug 2005	

Talks & Seminars (invited talks denoted by boldface)

- 2015 jamboree, NRC-Herzberg; **Orion (Un)Plugged workshop**; seminar, Max Planck Institute for Extraterrestrial Astrophysics; seminar, Max Planck Institute for Astronomy; **colloquium, DRAO**; science tea, NRC-Herzberg
- 2014 jamboree, NRC-Herzberg; **colloquium, Royal Military College of Canada**; colloquium, Queen's University; **NRAO workshop on Filamentary Structure in Molecular Clouds**; seminar, Joint Astronomy Centre (Hawaii); **AAS Workshop on Dense Cores: Origin, Evolution, and Collapse**; **MODEST workshop on Dance of the Stars: Dense Stellar Systems From Infant to Old**
- 2013 **colloquium, NRC-Herzberg**; star formation talk, Yale University; **colloquium, University of Massachusetts**; star formation lunch talk, Harvard Smithsonian Center for Astrophysics (CfA); astronomy journal club, McMaster University; talk, CASCA
- 2012 **colloquium, Origins Institute at McMaster University**; The Formation and Early Evolution of Stellar Clusters; Early Phase of Star Formation; CASCA annual meeting; The Future of mm/submm Astronomy in Canada
- 2011 **colloquium, Astronomy Department, Boston University**; seminar, JAC; colloquium, Institute for Astronomy (Hawaii); seminar, Radio and Geoastronomy Division, CfA; **ALMA Community Day workshop, CfA**; postdoc symposium, CfA; CASCA annual meeting
- 2010 **colloquium, CFHT**; **Plaskett Medal talk, CASCA**; **colloquium, Saint Mary's University**; seminar, HIA; seminar, JAC; The Origin of Stellar Masses conference; star formation lunch talk, CfA; star formation talk, University of Arizona; AAS annual meeting
- 2009 Radio and Geoastronomy Division talk, CfA; Dense Cores in Dark Clouds LXV; postdoc symposium, CfA
- 2008 star formation journal club, CfA; Early Phase of Star Formation conference; CASCA annual meeting; star formation jamboree, University of Toronto
- 2007 science tea, Herzberg Institute of Astrophysics; CASCA; star formation journal club, The University of Western Ontario
- 2006 CASCA (Best Student Talk Award by the CASCA Graduate Student Committee); Northwest Astronomers Meeting; science tea, HIA

## Mentorship

NRC-Herzberg Co-supervised undergraduate student (co-op program) Co-advisor: Dr Doug Johnstone Project: Analyze the JCMT - SCUBA2 GBS data of the IC 5146 cloud and compare with the protostellar population and large-scale column density	May - Aug 2015
NRC-Herzberg Sole advisor: undergraduate student (co-op program) Project: Identify dense cores and analyze their clustering properties in the Orion A molecular cloud using JCMT - SCUBA2 Gould Belt Legacy Survey data.	Sept - Dec 2014
McMaster University Mentored undergraduate thesis student Primary advisor: Dr Ralph Pudritz Project: Analyze the column density distribution of filaments formed in a turbulent MHD simulation.	Sept 2012 - Aug 2013
Center for Astrophysics Co-supervised summer student (REU program) Co-advisor: Dr Stella Offner Project: Analyze the evolution of the positions and masses of stars formed in a driven turbulence star formation simulation & compare to real observations.	Jun - Aug 2012
Center for Astrophysics Mentored visiting undergraduate thesis student from France Primary advisor: Dr Phil Myers Project: Measure the protostellar luminosities in NGC 1333 using a combination of archival data, and compare to the Myers model predictions.	Mar - Aug 2012
Center for Astrophysics Co-supervised summer student (REU program) Co-advisors: Dr Stella Offner, Dr Alyssa Goodman Project: Create synthetic observations of a driven turbulence star formation simulation & compare to real observations.	Jun - Aug 2011
Center for Astrophysics Mentored visiting undergraduate thesis student from France Primary advisor: Dr Phil Myers Project: Model initial column density distributions in young stellar clusters based on current YSO masses and locations.	Feb - Aug 2010
Herzberg Institute for Astrophysics Mentored undergraduate co-op students Primary advisors: Dr Doug Johnstone, Dr James Di Francesco Project: Reduce all SCUBA data and identify dense cores for Legacy Catalogue	summers 2005, 2006

## Related Experience

Referee, A&A, ApJL, ApJ	2009 - ongoing
Co-Organizer, NRC Herzberg Colloquium Series	2013 - ongoing
Primary organizer, Star Formation Jamboree at McMaster University two day informal meeting hosted by the Origins Institute; attendees from southern Ontario, Michigan, Ohio, and NY	May 2013
Panel member, CASCA Graduate Student workshop on careers	May 2013
NRAO time allocation committee, star formation panel member	2012-2013
Participant, full day presentation skills workshop (run by MITACS)	Jan 2013
Co-Organizer, Star Formation Lunch Discussion at CfA weekly presentation and discussion on topics of interest	Sept 2009 - Aug 2012
Co-I of a successful Smithsonian grant Wrote the bulk of the application for a \$50,000 Scholarly Studies Program Smithsonian internal grant; P.I. Phil Myers.	June 2011
Participant, Astronomy Education Workshop 2 day NASA Center for Astronomy Education Tier I (introductory) workshop for teaching college level astronomy to non-majors	May 2011
JCMT, external reviewer for Canadian Time Allocation Committee	Oct 2010
LOC member, Dense Cores in Dark Clouds LXV meeting	Oct 2009
Teaching Assistant, University of Victoria weekly lab instructor for ASTR 120 for groups of 20 students	2003 - 2006, 2008 - 2009
Secretary, Graduate Student Committee of CASCA	2008 - 2009
UVic Representative, Graduate Student Committee of CASCA	2007 - 2009
Research Assistant, University of Toronto (2/3 NSERC USRA; 2/3 with Howard Yee, 1/3 with Doug Johnstone)	summers 2000-2002
Participant, Consortium for Undergraduate Research and Education in Astronomy program, Mt Wilson Observatory, CA	Aug 2002

## Other

Trex (Girl Guide) leader An outdoors-focussed Girl Guide group for girls aged 11 to 17. Also a continuous member of Guiding since 1988.	2013-ongoing
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## Select Outreach

Community astronomy tours including Girl Guides, Science Venture, Girls Science Club, etc	2004-2009, 2015
International Astronomy Day Helped with the 'Ask An Astronomer' booth or solar astronomy viewings at annual astronomy outreach event	2004-2007, 2014
Tour leader for McCallion Planetarium at McMaster University	2013
Cambridge Explores the Universe Helped staff the 'Ask An Astronomer' booth, facilitated telescope tours and other activities	2009-2012
Fresh Pond Volunteer Day Gave a presentation on astronomy at annual potluck for local habitat restoration group	2012
Interview with an Astrophysicist Participated in an interview and discussion with an undergraduate physics student at UNB for a project on 'interview an astrophysicist'	2011, 2012
International Year of Astronomy Helped create and staff display at Luminara Festival	2009
Royal Astronomical Society of Canada Victoria Public talk	2008
Girl Guide Science Night Helped to organize and run two-night event for 200 girls	2006
Girl Guide Astronomy Trained adult leaders on astronomy activities for girls, and visited groups directly to lead exercises with girls	1999-2003

## Media

CFOX 1020 radio interview (Victoria) on night sky and astronomy	2014
McMaster Press Release (Hamilton) on Banting Fellowship	2012
CBC Newsworld tv interview (Halifax) on Plaskett medal research	2010
Times Colonist newspaper interview (Victoria) on local scientists	2008

## Submitted Papers

5. Klassen, M., Pudritz, R. E., & **Kirk, H.**, MNRAS submitted Dec 24, 2015 *Filamentary flow and magnetic geometry in evolving cluster-forming molecular cloud clumps*
4. Rumble, D. et al, MNRAS submitted Dec 24, 2015 *The JCMT Gould Belt Survey: Evidence for radiative heating and contamination in the W40 complex*
3. **Kirk, H.**, Johnstone, D., Di Francesco, J., Lane, J., et al, ApJ resubmitted Jan 15, 2016 (originally submitted Nov 18, 2015) *The JCMT Gould Belt Survey: Dense Core Clusters in Orion B*
2. Chen, M. C.-Y., Di Francesco, J., Johnstone, D., Sadavoy, S., Hatchell, J., Mottram, J. C., **Kirk, H.** et al, ApJ, referee's report received Nov 24 (submitted Oct 13, 2015) *The JCMT Gould Belt Survey: Evidence for Dust Grain Evolution in Perseus Star-Forming Clumps*
1. Broekhoven-Fiene, H., Matthews, B. C., Harvey, P., **Kirk, H.**, Pattle, K., Lane, J., and the GBS team, ApJ, referee's report received Nov 12 (submitted Sept 29, 2015) *The JCMT Gould Belt Survey: A first look at the Auriga-California Molecular Cloud with SCUBA-2*

## Refereed Papers

32. Coude, S., Bastien, P., **Kirk, H.**, Johnstone, D., Drabek-Maunder, E., Graves, S., Hatchell, J., Chapin, E.L., Gibb, A.G., Matthews, B., and the JCMT Gould Belt Survey Team, MNRAS accepted Dec 24, 2015 *The JCMT Gould Belt Survey: The Effect of Molecular Contamination in SCUBA-2 Observations of Orion A*
31. Pfalzner, S., **Kirk, H.**, Sills, A., Urquhart, J. S., Kauffmann, J., Kuhn, M., Bhandare, A., & Menten, K. A&A, accepted Dec 1, 2015 (available at <http://arxiv.org/abs/1512.00334>) *Observational constraints on star cluster formation theory - I. The mass-radius relation*
30. **Kirk, H.**, Di Francesco, J., Johnstone, D., Duarte-Cabral, A., Sadavoy, S., Hatchell, J., et al, ApJ accepted Nov 30, 2015 (available at <http://arxiv.org/abs/1512.00893>) *The JCMT Gould Belt Survey: A First Look at Dense Cores in Orion B*
29. Mairs, S., Johnstone, D., **Kirk, H.**, Graves, S., et al. 2015, MNRAS, 454, 2557 *The JCMT Gould Belt Survey: A Quantitative Comparison Between SCUBA-2 Data Reduction Methods*
28. Pattle, K. et al, 2015, MNRAS, 450, 1094 *The JCMT Gould Belt Survey: First results from the SCUBA-2 observations of the Ophiuchus molecular cloud and a virial analysis of its prestellar core population*
27. Buckle, J. V., Drabek-Maunder, E., Greaves, J., Richer, J. S., Matthews, B. C., Johnstone, D., **Kirk, H.** et al. 2015, MNRAS, 449, 2472 *The JCMT Gould Belt Survey: SCUBA-2 observations of circumstellar disks in L 1495*
26. Salji, C. , Richer, J. S., Buckle, J. V., Di Francesco, J., Hatchell, J., Hogerheijde, M., Johnstone, D., **Kirk, H.** & Ward-Thompson, D., on behalf of the JCMT GBS Consortium, MNRAS 449, 1782 *The JCMT Gould Belt Survey: Properties of Star-Forming Filaments in Orion A North*
24. Salji, C., Richer, J.S., Buckle, J.V., Hatchell, J., **Kirk, H.**, and the GBS team, 2015, MNRAS, 449, 1769 *The JCMT Gould Belt Survey: Constraints on prestellar core properties in Orion A North*

24. **Kirk, H.**, Klassen, M., Pudritz, R. E. & Pillsworth, S., ApJ 2015, 802, 75 *The Role of Turbulence and Magnetic Fields in Simulated Filamentary Structure*
23. Rumble, D., Hatchell, J., Gutermuth, R. A., **Kirk, H.**, Buckle, J., and the GBS team, 2015, MNRAS, 448, 1551 *The JCMT Gould Belt Survey: evidence for radiative heating in Serpens MWC 297 and its influence on local star formation*
22. **Kirk, H.**, Offner, S. S. R., & Redmond, K. 2014, MNRAS, 439, 1765 *The Formation and Evolution of Small Star Clusters*
21. **Kirk, H.**, Myers, P. C., Bourke, T. L., Gutermuth, R. A., Hedden, A., & Wilson, G. W. 2013, ApJ, 766, 115 *Filamentary Accretion Flows in the Embedded Serpens South Protocluster*
20. Friesen, R. K., **Kirk, H.**, & Shirley, Y. L. 2013, ApJ, 765, 59 *An Analysis of the Deuterium Fractionation of Star-forming Cores in the Perseus Molecular Cloud*
19. Masiunas, L. C., Gutermuth, R. A., Pipher, J. L., Megeath, S. T., Myers, P. C., Allen, L. E., **Kirk, H.**, & Fazio, G. G. 2012, ApJ, 752, 127 *Analyzing Structure in Star-Forming Region AFGL 490*
18. **Kirk, H.** & Myers, P. C., 2012, ApJ, 745, 131 *Variations in the Mass Functions of Clustered and Isolated Young Stellar Objects*
17. Michel, M., **Kirk, H.**, & Myers, P. C. 2011, ApJ, 735, 51 *Mass Distributions of Stars and Cores in Young Groups and Clusters*
16. **Kirk, H.** & Myers, P. C. 2011, ApJ, 727, 64 *Young Stellar Groups and Their Most Massive Stars*
15. **Kirk, H.**, Pineda, J. E., Johnstone, D., & Goodman, A. A. 2010, ApJ, 723, 457 *The Dynamics of Dense Cores in the Perseus Molecular Cloud II: The Relationship Between Dense Cores and the Cloud*
14. Johnstone, D., Rosolowsky, E., Tafalla, M., & **Kirk, H.** 2010, ApJ, 711, 655 *Dense Gas Tracers in Perseus: Relating the N<sub>2</sub>H<sup>+</sup>, NH<sub>3</sub>, and Dust Continuum Properties of Pre- and Protostellar Cores*
13. Matthews, H., **Kirk, H.**, Johnstone, D., Weferling, B., Cohen, M., Jenness, T., Evans, A., Davis, G., Dent, W., Fuller, G., Jackson, J., Rathborn, J., Richer, J., & Simon, R. 2009, AJ, 138, 1380 *Looking through the Galactic Plane: Imaging Cold Dust toward l=44 degrees*
12. **Kirk, H.**, Johnstone, D., & Basu, S. ApJ 2009, 699, 1433 *The Interplay of Turbulence and Magnetic Fields in Star-Forming Regions: Simulations and Observations*
11. Matthews, H. E., McCutcheon, W. H., **Kirk, H.**, White, G. J., & Cohen, M. 2008, AJ, 136, 2083 *The Distribution and Properties of Cold Dust in NGC 6334*
10. Jørgensen, J. K., Johnstone, D., **Kirk, H.**, Myers, P. C., Allen, L., & Shirley, Y. 2008, ApJ, 683, 822 *Current Star Formation in the Ophiuchus and Perseus Molecular Clouds: Constraints and Comparisons from Unbiased Submillimeter and Mid-Infrared Surveys. II*
9. Di Francesco, J., Johnstone, D., **Kirk, H.**, MacKenzie, T., & Ledwosinska, E. 2008, ApJS, 175, 277 *The SCUBA Legacy Catalogue: A Catalogue of Submillimetre Continuum Objects Detected by SCUBA*
8. **Kirk, H.**, Johnstone, D., & Tafalla, M. 2007, ApJ, 668, 1042 *Dynamics of Dense Cores in the Perseus Molecular Cloud*

7. Ward-Thompson et al. 2007, PASP, 119, 855 *The James Clerk Maxwell Telescope Legacy Survey of Nearby Star-forming Regions in the Gould Belt*
6. Jørgensen, J. K., Johnstone, D., **Kirk, H.**, & Myers, P. C. 2007, ApJ, 656, 293 *Current Star Formation in the Perseus Molecular Cloud: Unbiased Mid-Infrared Surveys*
5. **Kirk, H.**, Johnstone, D., & Di Francesco, J. 2006, ApJ, 646, 1009 *The Large and Small Scale Structures of Dust in the Star-Forming Perseus Molecular Cloud*
4. Walawender, J., Bally, J., **Kirk, H.**, Johnstone, D., Reipurth, B., & Aspin, C. 2006, AJ, 132, 467 *Multiple Outflows and Protostars Near IC348 and the Flying Ghost Nebula*
3. Ridge, N. A., Di Francesco, J., **Kirk, H.**, Li, D., Goodman, A. A., Alves, J. F., Arce, H. G., Borkin, M. A., Caselli, P., Foster, J. B., Heyer, M. H., Johnstone, D., Kosslyn, D. A., Lombardi, M., Pineda, J. E., Schnee, S. L., & Tafalla, M. 2006, AJ, 131, 2921 *The COMPLETE Survey of Star Forming Regions : Phase I Data*
2. Walawender, J., Bally, J., **Kirk, H.**, & Johnstone, D. 2005, AJ, 130, 1795 *Multiple Outflows and Protostars in Barnard 1*
1. Johnstone, D., Di Francesco, J., & **Kirk, H.** 2004, ApJL, 611, 45 *An Extinction Threshold for Protostellar Cores in Ophiuchus*

#### Non-refereed contributions

2. **Kirk, H.** 2011, JRASC, 105, 2 *The Plaskett Lecture: Star Formation in the Perseus Molecular Cloud*
1. Bally, J., Walawender, J., Johnstone, D., **Kirk, H.**, & Goodman, A. A. 2008, Handbook of Star Forming Regions, Volume I: The Northern Sky, ed B. Reipurth, pp308 *The Perseus Cloud*