

Aki Roberge

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RESEARCH INTERESTS : The study of planet formation through multi-band observations of young circumstellar disks; planning for future observations of exoplanets

EDUCATION

The Johns Hopkins University, Baltimore, MD

Ph.D. in Astrophysics 2002
Thesis title: "Ultraviolet Spectroscopy of Circumstellar Disks,"

M.A. in Physics 1999

Massachusetts Institute of Technology, Cambridge, MA

B.S. in Physics w/ Planetary Science minor 1996

PROFESSIONAL APPOINTMENTS

Research Astrophysicist 2008 – present
NASA Goddard Space Flight Center, Exoplanets & Stellar Astrophysics Lab.
UV to far-IR spectroscopy of gas in protoplanetary disks & photometry of dust in nearby debris disks; Development of future space telescope mission concepts

NASA Postdoctoral Program Research Associate 2005 – 2008
NASA Goddard Space Flight Center, Exoplanets & Stellar Astrophysics Lab.
Far-UV spectroscopy of atomic gas in debris disks; *Spitzer* mid- to far-IR survey for new debris disks with gas and dust; Development of future space telescope mission concepts

Carnegie Postdoctoral Research Fellow 2002 – 2005
Carnegie Institution of Washington, Dept. of Terrestrial Magnetism
Far-UV spectroscopy of molecular gas in debris disks; Spatially resolved optical spectroscopy and coronagraphic imaging of a protoplanetary disk

Graduate Research Assistant 1997 – 2002
The Johns Hopkins University, Dept. of Physics & Astronomy
Far-UV spectroscopy of gas and star-grazing planetesimals in protoplanetary and debris disks;
Study of stellar activity in early-type stars

AWARDS

NASA Goddard Space Flight Center Peer Award 2010
National Research Council Research Associateship Award 2005
Barbara McClintock Carnegie Fellowship 2002

SELECTED FUNDED PROJECTS

NASA Large Binocular Telescope Interferometer

Collaborator on Key Science Team proposal (PI: A. Weinberger) 2012 – present
 “Signal and Noise: Debris Disks and Exozodiacal Dust”

NASA Research Opportunities in Space and Earth Sciences (ROSES)

PI on ROSES Origins of Solar Systems project 2009 – 2012
 “Finding the Needle in the Haystack: Realistic Simulations of ExoEarth Observations in the Presence of Exozodiacal Dust”

ESA *Herschel Space Observatory*

PI on Open Time 2 program OT2_aroberge_3 2012
 “Ultra-Cold Material in Young Debris Disks”
 Co-I on Open Time Key Programme “Gas in Protoplanetary Systems” 2009 – 2013
 (GASPS; PI: W. Dent)
 Co-I on Open Time Key Programme “Dust Around Nearby Stars” 2009 – 2013
 (DUNES; PI: C. Eiroa)

NASA/ESA *Hubble Space Telescope*

PI on cycle 20 program GO-12901 2012
 “An Inventory of Gas in a Debris Disk: Far-UV Spectroscopy of 49 Ceti”
 Co-I on cycle 19 program GO-12512 (PI: A. Weinberger) 2011
 “Debris Disk Chemistry from Spatially Resolved Spectroscopy”
 PI on cycle 17 program GO-11596 2008
 “Coronagraphic Imaging of Debris Disks Containing Gas”

NASA Astrophysics Strategic Mission Concept Studies

Co-I on *New Worlds Observer* telescope + free-flying occulter mission study (PI: W. Cash)
 Co-I on *Star Formation Observatory* optical/UV instrument study (PI: P. Scowen)

NASA *Spitzer Space Telescope*

PI on cycle 2 program 20280 2005
 “Determining the Disk Fraction Among Shell Stars: A Survey for CS Disks with Gas and Dust”

NASA Origins Science Mission Concept Study

Co-I on *HORUS* UV/optical telescope mission study (PI: J. Morse)

NASA/CNES/CSA *Far Ultraviolet Spectroscopic Explorer*

PI on cycle 4 program D032 2003
 “Circumstellar Gas in Young Planetary Debris Disks”

OTHER OBSERVING EXPERIENCE

Magellan Telescopes, Las Campanas, Chile 2002 – 2008
 PI of two projects involving near-IR imaging of H₂ around CS disk stars and in the R CrA star-forming region; Co-I on an optical spectroscopic survey of CS gas around nearby shell stars; Co-I on a mid-IR photometric survey for CS disks and a near-IR survey for Herbig-Haro jets from protostars

W. M. Keck Telescopes, Mauna Kea, Hawaii 2003
 Co-I on a mid-IR photometric survey for CS disks

PROFESSIONAL ACTIVITIES

Team member, Goddard Center for Astrobiology, NASA Astrobiology Institute 2008 – present
[\[link to website\]](#)

Science Team member, *New Worlds Observer* mission concept (PI: W. Cash) 2007 – 2012

Science Team member, *SOFIA* HIRMES instrument concept (PI: S. Moseley) 2011

Science Team member, *HORUS/Star Formation Observatory* mission concept 2004 – 2009
 (PI: J. Morse/P. Scowen)

Leader, Team Program on Far-UV Spectroscopy of YSOs, Disks, & Extrasolar Planets

Science Team member, *Fourier-Kelvin Stellar Interferometer (FKSI)* mission 2007 – 2008
 concept (PI: W. Danchi)

Science Team member, *Space Infrared Interferometric Telescope (SPIRIT)* 2007 – 2008
 mission concept (PI: D. Leisawitz)

Science Team member, *Stellar Imager* mission concept (PI: K. Carpenter) 2007 – 2008

Debris Disks Team co-leader, NASA's Navigator Program Science Forum May 2006

Science Team associate member, *Far Ultraviolet Spectroscopic Explorer*, 2001 – 2007
 Circumstellar Disks Group

SERVICE

Executive Committee member, NASA Exoplanets Exploration Program 2009 – present
 Analysis Group (ExoPAG) [\[link to website\]](#)

Science Vision Team member, NASA Goddard Space Flight Center 2011

Science Director's Council member, NASA Goddard Space Flight Center 2009 – 2011

Extrasolar Planets Seminar co-organizer, NASA Goddard Space Flight Center	2006 – 2011
NASA Goddard Association of Postdoctoral Scholars vice-president (civil servant advisor)	2009 – 2010
Scientific organizing committee member	
“Physics of Planetary Atmospheres: From Earth to Exoplanets,” AGU Chapman Conference, Annapolis MD	2013
“Enhancing the Legacy of HST Spectroscopy” Workshop, Baltimore MD	Nov. 2012
“From Atoms to Pebbles: Herschel’s View of Star and Planet Formation” Symposium, Grenoble, France	Mar. 2012
“Far-IR Astronomy from Space: A Community Workshop about the Future,” Pasadena CA	May 2008
<i>Multimission Archive at Space Telescope (MAST) Users Group Advisory</i> Committee member	2003 – 2006
Proposal review panel member, NASA ROSES Origins of Solar Systems, NSF Astronomy, NASA <i>Hubble Space Telescope</i> , & W. M. Keck Observatory (NASA time)	
External proposal reviewer, French Agence Nationale de la Recherche, Canadian Space Agency, & Netherlands Organization for Scientific Research	
Referee for <i>The Astronomical Journal</i> , <i>The Astrophysical Journal</i> , <i>The Astrophysical Journal Letters</i> , <i>Astronomy & Astrophysics</i>	

TEACHING EXPERIENCE

Research advisor, University of Maryland, Astronomy Dept. Ph.D. students: J. Donaldson, M. Rizzo	2010 – present
NASA research advisor, Graduate Student Researchers Program (GSRP) Ph.D. student: T. Monroe (Indiana University)	2009 – 2011
Guest lecturer, Catholic University of America, Physics Dept. astronomy seminar	Fall 2007
Research advisor, Catholic University of America, Physics Dept. Ph.D. student: L. Quick	2007 – 2009
Assistant research advisor, University of Maryland, Physics Dept. Ph.D. student: D. Jontof-Hutter (primary advisor: M. Kuchner)	2006 – 2008
Advisor, Carnegie Institution of Washington, Dept. of Terrestrial Magnetism Research Experience for Undergraduates Summer Program	2003, 2004

Graduate teaching assistant, Johns Hopkins University, Physics Dept. 1996 – 1997
Undergraduate level *General Physics for Biological Science Majors* & general physics lab.

SELECTED PUBLIC OUTREACH

Panel member, “Exoplanets and Astrobiology” panel discussion at the Science Fiction & Fantasy Writers of America Nebula Awards Weekend	May 2012
Featured scientist, Exoplanets & Astrobiology module, Family Science Night, NASA Goddard Space Flight Center Visitor’s Center	May 2012
Panel member, “Science Fiction Meets Science Fact” panel discussion for visiting fiction writers, NASA Goddard Space Flight Center	Dec. 2011
Panel member, “Science Fiction & Science Fact” panel discussion for general public, STS-135 shuttle launch event, NASA Kennedy Space Center Visitor’s Complex	July 2011
Interviewee, “20 Years of Hubble Science: Exoplanets,” NASA Goddard Multimedia video series [link to video]	July 2010
Featured scientist, NASA Goddard Space Flight Center, “Imagine the Universe!” educational website [link to webpage]	Fall 2007

INVITED TALKS

University of Delaware, Dept. of Physics & Astronomy Colloquium	Dec. 2012
<i>Exoplanets Exploration Program Analysis Group Meeting VI</i> , Reno NV	Oct. 2012
University of Washington, Astronomy Dept. Colloquium	Feb. 2012
<i>Exoplanets Exploration Program Analysis Group Meeting V</i> , Austin TX	Jan. 2012
NASA Goddard Space Flight Center, Science Jamboree	June 2011
<i>Exoplanets Exploration Program Analysis Group Meeting IV</i> , Alexandria VA	June 2011
Space Telescope Science Institute, ALMA Community Day Workshop	Apr. 2011
Indiana University, Astronomy Dept. Colloquium	Nov. 2010
<i>Exoplanets Exploration Program Analysis Group Meeting II</i> , Pasadena CA	June 2010
NASA Goddard Space Flight Center, Astrophysics Science Division Colloquium	Apr. 2010
Johns Hopkins University Applied Physics Lab, Planetary Science Seminar	Mar. 2010

<i>The Origin and Fate of the Sun: Evolution of Solar-Mass Stars Conference,</i> Garching, Germany	Mar. 2010
<i>Exoplanets Exploration Program Analysis Group Meeting I</i> , Washington DC	Jan. 2010
Howard University, Dept. of Physics & Astronomy Colloquium	Oct. 2009
Space Telescope Science Institute, Star & Planet Formation Seminar	Mar. 2009
<i>Future Directions in Ultraviolet Spectroscopy Conference</i> , Annapolis MD	Oct. 2008
University of Rochester, Astronomy & Astrophysics Seminar	Sept. 2008
NASA Jet Propulsion Laboratory, Astrophysics Colloquium	Mar. 2008
University of Louisville, Dept. of Physics & Astronomy Seminar	Mar. 2008
<i>Science with the New HST After Servicing Mission 4 Conference</i> , Bologna, Italy	Jan. 2008
SUNY at Stony Brook, Astronomy & Astrophysics Seminar	Jan. 2008
<i>International Conference on Extreme Solar Systems</i> , Santorini, Greece	June 2007
Arizona State University, SESE Colloquium	Mar. 2007
Space Telescope Science Institute, Science Colloquium	Feb. 2007
Pennsylvania State University, Dept. of Astronomy & Astrophysics Colloquium	Feb. 2007
NASA Goddard Space Flight Center, Planetary Science Seminar	Sept. 2006
Carnegie Institution of Washington, DTM Colloquium	May 2006
<i>NASA Astrobiology Science Conference</i> , Mini-Keynote Session, Washington, DC	Mar. 2006
NASA Goddard Space Flight Center, LASP Seminar	Apr. 2003

SELECTED PRESS COVERAGE

Sky & Telescope Magazine, “The Birth of Carbon Planets?”	Sept. 2006
National Geographic (web), “Nearby Star System Could Spawn Carbon-Rich Planets”	June 7, 2006
United Press International (web), “Baby solar system found full of carbon”	June 7, 2006
Science News Magazine, “Is this young star ready to form planets?”	Nov. 24, 2001

REFEREED PUBLICATIONS

- Roberge, A.**, Chen, C. H., Millan-Gabet, R., Weinberger, A. J., Hinz, P. M., Stapelfeldt, K. R., Absil, O., Kuchner, M. J., & Bryden, G. (2012). "The Exozodiacal Dust Problem for Direct Observations of ExoEarths." *Publications of the Astronomical Society of the Pacific*, 124, 799
- Meeus, G., Montesinos, B., Mendigutía, I., Kamp, I., Thi, W.-F., Eiroa, C., Grady, C. A., Mathews, G., Sandell, G., Martin-Zaidi, C., Brittain, S., Dent, W. R. F., Howard, C., Ménard, F., Pinte, C., **Roberge, A.**, Vandenbussche, B., & Williams, J. (2012). "Observations of Herbig Ae/Be stars with Herschel/PACS. The Atomic and Molecular Contents of Their Protoplanetary Discs." *Astronomy & Astrophysics*, 544, A78
- Donaldson, J. K., **Roberge, A.**, Chen, C. H., Augereau, J.-C., Dent, W. R. F., Eiroa, C., Krivov, A. V., Mathews, G. S., Meeus, G., Ménard, F., Riviere-Marichalar, P., & Sandell, G. (2012). "Herschel PACS Observations and Modeling of Debris Disks in the Tucana-Horologium Association." *The Astrophysical Journal*, 753, 147
- Turnbull, M. C., Glassman, T., **Roberge, A.**, Cash, W., Noecker, C., Lo, A., Mason, B., Oakley, P., & Bally, J. (2012). "The Search for Habitable Worlds: I. The Viability of a Starshade Mission." *Publications of the Astronomical Society of the Pacific*, 124, 418
- France, K., Linsky, J. L., Tian, F., Froning, C. S., **Roberge, A.** (2012). "Time-Resolved Ultraviolet Spectroscopy of the M-dwarf GJ 876 Exoplanetary System." *The Astrophysical Journal*, 750, L32
- Lebreton, J., Augereau, J.-C., Thi, W.-F., **Roberge, A.**, Donaldson, J., Schneider, G., Maddison, S. T., Ménard, F., et al. (2012). "An icy Kuiper-Belt around the young solar-type star HD181327." *Astronomy & Astrophysics*, 539, A17
- Tilling, I., Woitke, P., Meeus, G., Mora, A., Montesinos, B., Riviere-Marichalar, P., Eiroa, C., Thi, W.-F., Isella, A., **Roberge, A.**, et al. (2012). "Gas modelling in the disc of HD163296." *Astronomy & Astrophysics*, 538, A20
- Eiroa, C., Marshall, J. P., Mora, A., Krivov, A. V., Montesinos, B., Absil, O., Ardila, D., Arevalo, M., et al. (2011). "Herschel discovery of a new class of cold, faint debris disks." *Astronomy & Astrophysics*, 536, L4
- Marshall, J. P., Löhne, T., Montesinos, B., Krivov, A. V., Eiroa, C., Absil, O., Bryden, G., Maldonado, J., et al. (2011). "A Herschel Resolved Far-Infrared Dust Ring Around HD207129." *Astronomy & Astrophysics*, 529, A117
- Roberge, A.** & Kamp, I. (2010). "Protoplanetary & Debris Disks." In *Exoplanets* (ed. S. Seager), The Univ. of Arizona Space Science Series, Univ. of Arizona Press, Tucson AZ, p. 269-295
- Mathews, G. S., Dent, W. R. F., Williams, J. P., Howard, C. D., Meeus, G., Riaz, B., **Roberge, A.**,

- Sandell, G., et al. (2010). "Gas in Protoplanetary Systems: I. First Results." *Astronomy & Astrophysics*, 518, L127
- Thi, W.-F., Mathews, G. S., Ménard, F., Woitke, P., Meeus, G., Riviere-Marichalar, P., Pinte, C., Howard, C. D., **Roberge, A.**, et al. (2010). "Herschel-PACS observation of the 10 Myr old T Tauri disk TW Hya: Constraining the disk gas mass." *Astronomy & Astrophysics*, 518, L125
- Meeus, G., Pinte, C., Woitke, P., Montesinos, B., Mendigutia, I., Riviere-Marichalar, P., Eiroa, C., Mathews, G., Vandenbussche, B., Howard, C. D., **Roberge, A.**, et al. (2010). "Gas in the protoplanetary disc of HD169142: Herschel's view." *Astronomy & Astrophysics*, 518, L124
- Pinte, C., Woitke, P., Ménard, F., Duchêne, G., Kamp, I., Meeus, G., Mathews, G., Howard, C. D., et al. (2010). "Gas and dust in protoplanetary discs as seen by Herschel/GASPS: Statistical comparison with the DENT grid of models." *Astronomy & Astrophysics*, 518, L126
- Eiroa, C., Fedele, D., Maldonado, J., González-García, B. M., Rodmann, J., Heras, A. M., Pilbratt, G. L., Augereau, J.-C., et al. (2010). "Cold DUst around NEarby Stars (DUNES). First Results: A Resolved Exo-Kuiper Belt around the Solar-like Star ζ^2 Ret." *Astronomy & Astrophysics*, 518, L131
- Liseau, R., Eiroa, C., Fedele, D., Augereau, J.-C., Olofsson, G., González, B., Maldonado, J., Montesinos, B., et al. (2010). "Resolving the cold debris disc around a planet-hosting star: PACS photometric imaging observations of q1 Eri (HD10647, HR506)." *Astronomy & Astrophysics*, 518, L132
- Martin-Zaidi, C., Deleuil, M., Le Bourlot, J., Bouret, J.-C., **Roberge, A.**, Dullemond, C. P., Testi, L., Feldman, P. D., Lecavelier des Etangs, A., & Vidal-Madjar, A. (2008). "Molecular Hydrogen in the Circumstellar Environments of Herbig Ae/Be Stars Probed by FUSE." *Astronomy & Astrophysics*, 484, 225
- Roberge, A.**, & Weinberger, A. J. (2008). "Debris Disks Around Nearby Stars with Circumstellar Gas", *The Astrophysical Journal*, 676, 509
- France, K., **Roberge, A.**, Lupu, R. E., Redfield, S., & Feldman, P. D. (2007). "A Low-Mass H₂ Component in the AU Microscopii Circumstellar Disk." *The Astrophysical Journal*, 668, 1174
- Roberge, A.**, Feldman, P. D., Weinberger, A. J., Deleuil, M., & Bouret, J.-C. (2006). "Stabilization of the β Pictoris disk by extremely carbon-rich gas." *Nature*, 441, 724
- The NASA press release and media telecon about the above paper may be found at
<http://www.nasa.gov/vision/universe/starsgalaxies/betapicMM.html>
- Grady, C. A., Woodgate, B. E., Bowers, C. W., Gull, T. R., Sitko, M. L., Carpenter, W. J., Lynch,

- D. K., Russell, R. W., Perry, R. B., Williger, G. M., **Roberge, A.**, Bouret, J.-C., & Sahu, M. (2005). “Coronagraphic Imaging of Pre-Main-Sequence Stars with the Hubble Space Telescope *Space Telescope Imaging Spectrograph*. I. The Herbig Ae Stars.” *The Astrophysical Journal*, 30, 958
- Martin-Zaïdi, C., Deleuil, M., Simon, T., Bouret, J.-C., **Roberge, A.**, Feldman, P. D., Lecavelier des Etangs, A., & Vidal-Madjar, A. (2005) “*FUSE* observations of molecular hydrogen on the line of sight towards HD 141569A.” *Astronomy & Astrophysics*, 440, 921
- Roberge, A.**, Weinberger, A. J., Redfield, S., & Feldman, P. D. (2005). “Rapid Dissipation of Primordial Gas From the AU Microscopii Debris Disk.” *The Astrophysical Journal*, 626, L105
- Roberge, A.**, Weinberger, A. J., & Malumuth, E. M. (2005). “Spatially Resolved Spectroscopy and Coronagraphic Imaging of the TW Hydriæ Circumstellar Disk.” *The Astrophysical Journal*, 622, 1171
- Deleuil, M., Bouret, J.-C., Catala, C., Lecavelier des Etangs, A., Vidal-Madjar, A., **Roberge, A.**, Feldman, P. D., Martin, C., & Ferlet, R. (2005). “New insights in the FUV into the activity of the Herbig Ae star HD 163296.” *Astronomy & Astrophysics*, 429, 247
- Deleuil, M., Lecavelier des Etangs, A., Bouret, J.-C., **Roberge, A.**, Vidal-Madjar, A., Martin, C., Feldman, P. D. & Ferlet R. (2004). “Evidence for wind and accretion in the Herbig Be star HD 100546 from *FUSE* observations.” *Astronomy & Astrophysics*, 418, 577
- Lecavelier des Etangs, A., Deleuil, M., Vidal-Madjar, A., **Roberge, A.**, Le Petit, F., Hébrard, G., Ferlet, R., Feldman, P. D., Désert, J.-M., & Bouret, J.-C. (2003). “*FUSE* observations of H₂ around the Herbig AeBe stars HD 100546 and HD 163296.” *Astronomy & Astrophysics*, 407, 935
- Bouret, J.-C., Deleuil, M., Lanz, T., **Roberge, A.**, Lecavelier des Etangs, A., & Vidal-Madjar, A. (2002). “A chromospheric scenario for the activity of β Pictoris, as revealed by *FUSE*.” *Astronomy & Astrophysics*, 390, 1049
- Roberge, A.**, Feldman, P. D., Lecavelier des Etangs, A., Vidal-Madjar, A., Deleuil, M., Bouret, J.-C., Ferlet, R., & Moos, H. W. (2002). “*FUSE* Observations of Possible Infalling Planetesimals in the 51 Ophiuchi Circumstellar Disk.” *The Astrophysical Journal*, 568, 343
- Lecavelier des Etangs, A., Vidal-Madjar, A., **Roberge, A.**, Feldman, P. D., Deleuil, M., André, M., Blair, W. P., Bouret, J.-C., Désert, J.-M., Ferlet, R., Friedman, S., Hébrard, G., Lemoine, M. & Moos, H. W. (2001). “Deficiency of molecular hydrogen in the disk of β Pictoris.” *Nature*, 412, 706

Deleuil, M., Bouret, J.-C., Lecavelier des Etangs, A., **Roberge, A.**, Vidal-Madjar, A., André, M., Blair, W. P., Feldman, P. D., Ferlet, R., Friedman, S. D., & Moos, H. W. (2001). “Is β Pictoris an Active Star?” *The Astrophysical Journal*, 557, L67

Roberge, A., Lecavelier des Etangs, A., Grady, C. A., Vidal-Madjar, A., Bouret, J.-C., Feldman, P. D., Deleuil, M., André, M., Boggess, A., Bruhweiler, F. C., Ferlet, R., & Woodgate, B. (2001). “*FUSE* and *HST/STIS* Observations of Hot and Cold Gas in the AB Aurigae System.” *The Astrophysical Journal*, 551, L97

Roberge, A., Feldman, P. D., Lagrange, A. M., Vidal-Madjar, A., Ferlet, R., Jolly, A., Lemaire, J. L., & Rostas, F. (2000). “High-Resolution *Hubble Space Telescope STIS* Spectra of CI and CO in the β Pictoris Circumstellar Disk.” *The Astrophysical Journal*, 538, 904

Accepted & Submitted Publications

Riviere-Marichalar, P., Barrado, D., Thi, W.-F., Augereau, J.-C., **Roberge, A.**, Eiroa, C., Montesinos, B., Meeus, G., Howard, C., Sandell, G., Duchêne, G., Dent, W. R. F., Lebreton, J., Mendigutía, I., Huélamo, Ménard, F., & Pinte, C. (2012). “HD172555: Detection of 63 μm [OI] Emission in a Debris Disk.” *Astronomy & Astrophysics*, *submitted*