Aki Roberge

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RESEARCH INTERESTS: Study of planet formation through multi-wavelength observations of young circumstellar disks. Development of future space telescope concepts.

EDUCATION

The Johns Hopkins University, Baltimore, MD
- Ph.D. in Astrophysics — 2003
- M.A. in Physics — 1999

Massachusetts Institute of Technology, Cambridge, MA
- B.S. in Physics w/ Planetary Science minor — 1996

PROFESSIONAL APPOINTMENTS

Associate Director for Technology & Strategy — 2022 – present
NASA Goddard Space Flight Center, Astrophysics Science Division
- Co-Chair, Habitable Worlds Observatory Technical Assessment Group — 2023 – present

Acting Deputy Director — 2021
NASA Goddard Space Flight Center, Sciences and Exploration Directorate

Discipline Scientist — 2020 – 2021
NASA Headquarters, Astrophysics Division
- Deputy Program Scientist, Nancy Grace Roman Space Telescope

Research Astrophysicist — 2008 – present
NASA Goddard Space Flight Center, Exoplanets & Stellar Astrophysics Lab.
- Study Scientist, NASA LUVOIR Decadal Large Mission Study — 2016 – 2019
- Member, WFIRST Formulation Science Working Group — 2015 – 2020
- Member, NASA Exoplanet Probe Science and Technology Definition Team, External Occulter (Exo-S) Concept — 2013 – 2015

NASA Postdoctoral Program Research Associate — 2005 – 2008
NASA Goddard Space Flight Center, Exoplanets & Stellar Astrophysics Lab.

Carnegie Postdoctoral Research Fellow — 2002 – 2005
Carnegie Institution of Washington, Dept. of Terrestrial Magnetism

Graduate Research Assistant — 1997 – 2002
The Johns Hopkins University, Dept. of Physics & Astronomy

Selected Awards

NASA Honor Awards, Exceptional Achievement Medal, "For exceptional and exemplary science leadership of the LUVOIR Decadal Mission Study" — 2020

Robert H. Goddard Award for Leadership, "For exceptional leadership to the LUVOIR Astro2020 Decadal concept study" — 2019

GSFC Special Act Award, "Exceptional Outreach to Minority Serving Institutions" — 2015

Robert H. Goddard Award for Science, "For excellence in original research on exoplanets and planet formation, and strategic service to NASA Astrophysics" — 2014

Selected Awarded Projects

NASA Interdisciplinary Consortia for Astrobiology Research

Co-I on "The Virtual Planetary Laboratory: Advancing the Search for Life Beyond the Solar System" — 2023 – 2028

NASA Nexus for Exoplanet System Science

Co-I on "The Virtual Planetary Laboratory: Advancing the Search for Life Beyond the Solar System" — 2018 – 2023

Co-I on "Rocky Planet Habitability: Insights from Solar System Climate Dynamics Through Time" — 2015 – 2019

NASA WFIRST Science Investigation Team — 2015 – 2020

Deputy PI for Turnbull Coronagraph SIT Team

NASA Research Opportunities in Space and Earth Sciences (ROSES)

Co-I on APRA project "Development and Flight-testing of Technology for Future NASA Astrophysics Missions" — 2015 – 2018

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

NASA Astrobiology Institute

Co-I on "Goddard Center for Astrobiology: Origin and Evolution of Organics in Planetary Systems" — 2008 – 2019

NASA Astrophysics Strategic Mission Concept Studies — 2008

Co-I on *New Worlds Observer* telescope + free-flying occulter mission study

Co-I on *Star Formation Observatory* optical/UV instrument study

NASA Origins Science Mission Concept Study — 2004

Co-I on *HORUS* UV/optical telescope mission study

Selected Service Activities

NASA Science Mission Directorate Large Mission Study core team member 2019 – 2021

NASA Planetary Science Advisory Committee member 2018 – 2020

US Military Academy Collaborative Consultation Committee member 2018 – 2019

NASA GSFC / Howard University Interaction Days co-organizer 2014 – 2016

NASA Astrophysics Visionary Roadmap team member 2013

NASA Exoplanet Exploration Program Analysis Group (ExoPAG) 2009 – 2013
Executive Committee member

Scientific Organizing Committees, Last 10 Years

- "NASA Sagan Exoplanet Summer Workshop", Pasadena CA July 2024
- "NASA Sagan Exoplanet Summer Workshop", Pasadena CA July 2022
- "NExSS Habitable Worlds 2021 Workshop", virtual Feb. 2021
- "NASA Sagan Exoplanet Summer Workshop", Pasadena CA July 2019
- "The Space Astrophysics Landscape for the Next Decade: Major Missions for the 2020s and Beyond", Washington DC Mar. 2019
- "NExSS Habitable Worlds 2017: A System Science Workshop", Laramie WY Nov. 2017
- "Exoclipse Conference", Boise ID Aug. 2017
- "High-Contrast Imaging in Space Workshop", Baltimore MD Nov. 2016
- "Space Telescopes and Instrumentation: Optical, Infrared, and Millimeter Wave", SPIE Astronomical Telescopes + Instrumentation Conference, Edinburgh, Scotland June 2016
- AAS Division for Planetary Science Annual Meeting, Washington DC Nov. 2015
- "Exploring the Universe with JWST Conference", Noordwijk, Netherlands Oct. 2015

Peer-Review Panels: chair, member, or external reviewer

NASA ROSES (ADSPS, APRA, SAT, TDEM, XRP, & Origins of Solar Systems), NASA *James Webb Space Telescope*, NASA Sagan Fellowship Program, NASA *Hubble Space Telescope*, ALMA Observatory, W. M. Keck Observatory, NSF Astronomy, European Research Council, French Agence Nationale de la Recherche, Canadian Space Agency, Netherlands Organization for Scientific Research

Selected Awarded Observing Proposals

NASA/ESA *James Webb Space Telescope*

- Co-I on Cycle 3 program "HD 131488: A Unique Laboratory to Probe Volatile Transportation Mechanism in the Epoch of Terrestrial Planet Formation" 2024

Co-I on Cycle 3 program "Catching a cat by the tail: Tracing Dust Dynamics in the Beta Pictoris Debris Disk in the Aftermath of Giant Collisions" 2024

Co-I on Cycle 1 program "Search for NIR Gas in Debris Disks. Is There a Water Delivery Mechanism?" 2021

Atacama Large Millimeter Array

Co-I on Cycle 7 program "C I Survey" 2019

PI on Cycle 3 program "The Mysterious Gas in the 49 Ceti Debris Disk" 2015

NASA/ESA *Hubble Space Telescope*

Co-I on Cycle 25 program "The Mega-MUSCLES Treasury Survey: Measurements of the UV Spectral Characteristics of Low-mass Exoplanetary Systems" 2017

PI on Cycle 23 program "Inventoring Gas in Debris Disks: UV Spectroscopy of η Tel" 2015

Co-I on Cycle 22 program "The MUSCLES Treasury Survey: Measurements of the UV Spectral Characteristics of Low-mass Exoplanetary Systems 2014

Large Binocular Telescope Interferometer

Co-I on NASA Key Science Team program "Signal *and* Noise: Debris Disks and Exozodiacal Dust" 2012 – 2017

ESA *Herschel Space Observatory*

PI on Open Time 2 program "Ultra-Cold Material in Young Debris Disks" 2012

Co-I on Open Time Key Programmes "Gas in Protoplanetary Systems" (GASPS) & "Dust Around Nearby Stars" (DUNES) 2009 – 2013

NASA *Spitzer Space Telescope*

PI on Cycle 2 program "Determining the Disk Fraction Among Shell Stars: A Survey for CS Disks with Gas and Dust" 2005

NASA/CNES/CSA *Far Ultraviolet Spectroscopic Explorer*

PI on Cycle 4 program "Circumstellar Gas in Young Planetary Debris Disks" 2003

Teaching & Mentoring

Research mentor, NASA Postdoctoral Program 2013 – present

Miles Currie, Eleonora Alei, Allison Youngblood, Maxime Rizzo, Christopher Stark

Research advisor, Ph.D. students 2007 – 2016

Amy Steele, Ashlee Wilkins, Jessica Donaldson (University of Maryland, College Park); Erika Nesvold (University of Maryland, Baltimore County); Tala Monroe (Indiana University); Lynnae Quick (Catholic University)

Research advisor, undergraduate and pre-doctoral students 2014 – 2020

Junellie Gonzalez-Quiles (UMCP); Steve Anusie, Aara'L Yarber, Ameer Blake (Howard University); Tiffany Jansen (University of Washington); Andrew Lincowski (University of Arizona); Brittany Miles (UCLA)

Graduate teaching assistant, Johns Hopkins University 1996 – 1997

Undergraduate level *General Physics for Biological Science Majors* & general physics lab.

Invited Talks, Last 5 Years

The Geoscience of Exoplanets: Going Beyond Habitability ISSI Workshop, Bern Switzerland — April 2024

Harvard-Smithsonian Center for Astrophysics Colloquium, Cambridge MA — Feb. 2024

International Conference on Computational Photography, Madison WI — July 2023

IEEE Space Mission Challenges for Information Technology Conference, online — July 2023

Science with the Habitable Worlds Observatory and Beyond Workshop, Baltimore MD — July 2023

New Great Observatories Splinter Meeting, 241st Meeting of the AAS, Seattle WA — Jan. 2023

UVSTIG Splinter Meeting, 241st Meeting of the AAS, Seattle WA — Jan. 2023

Ultraviolet Astronomy in the XXI Century Workshop, Vitoria-Gasteiz, Spain — Oct. 2022

NASA Sagan Exoplanet Summer Workshop, Pasadena CA — July 2022

"Multi-Faceted Views of Planet Formation" Meeting-in-a-Meeting, 240th Meeting of the AAS, Pasadena CA — June 2022

New Great Observatories Splinter Meeting, 240th Meeting of the AAS, Pasadena CA — June 2022

Enabling Future Comparative Exoplanetology Splinter Meeting, Exoplanets IV Conference, Las Vegas NV — May 2022

University of Washington Astrobiology Colloquium, Seattle WA — Apr. 2022

NASA GSFC Technical Managers Training, online — Mar. 2022

Robert H. Goddard Memorial Symposium, College Park MD — Mar. 2022

CHAMELEON Winterschool, Dutch Space Research Institute, online — Jan. 2022

Institut für Weltraumforschung Colloquium, Austrian Academy of Sciences, online — Jan. 2022

NASA Sagan Exoplanet Summer Workshop, online — July 2021

US Technology Leadership Council Speaker Series, online — May 2021

5th Network for Ultraviolet Astronomy Workshop, online — Oct. 2020

American Institute of Aeronautics and Astronautics Los Angeles-Las Vegas Section Meeting, online — July 2020

SPIE Optical Engineering + Applications Conference, San Diego CA — Aug. 2019

NASA Sagan Exoplanet Summer Workshop, Pasadena CA — July 2019

Selected Outreach

"Towards Earth 2.0: Exoplanets and Future Space Telescopes", Asian Pacific American Network in Agriculture seminar, US Dept. of Agriculture, remote — May 2023

"The Search for Life: Are We Alone?", NASA Curious Universe podcast — June 2022

Faces of NASA web feature — June 2022

World Above the Tetons Speaker Series, Wyoming Stargazing, remote — Apr. 2021

"Exoplanets Everywhere!" panel, AAAS News Briefing, Austin TX — Feb. 2018

"Towards Earth 2.0: Exoplanets and Future Missions", NASA GSFC presentation for US Congressman Babin and staff, Greenbelt MD — June 2017

"Finding Earth 2.0: Extraordinary Tools to Expand the Search Space", 86th Joseph Henry Lecture, Philosophical Society of Washington, Washington DC — May 2017

"The Search for Life", Maryland Space Business Roundtable Annual Reception, National Air and Space Museum, Washington DC — Sept. 2016

"Nearby Star's Icy Debris Suggests 'Shepherd' Planet" narrator, NASA Press Feature — Mar. 2014

"Exoplanets and Astrobiology" panel, Science Fiction & Fantasy Writers of America Nebula Awards Weekend — May 2012

Publications

Journal articles and book chapters: 94 (15 as first author), h-index: 41

Click to view full list of publications on the NASA Astrophysics Data System

Selected Publications

12. Quick, L. C., Roberge, A., Mendoza, G. T., Quintana, E., & Youngblood, A. A. (2023). "Prospects for Cryovolcanic Activity on Cold Ocean Planets." The Astrophysical Journal, 956, 29

11. Juanola-Parramon, R., Zimmerman, N. T., Pueyo, L., et al. (2022). "Modeling and Performance Analysis of the LUVOIR Coronagraph Instrument." Journal of Astronomical Telescopes, Instruments, and Systems, 8, 034001

10. Youngblood, A., Roberge, A., MacGregor, M. A., et al. (2021). "A Radiatively Driven Wind from the η Tel Debris Disk." The Astronomical Journal, 162, 235

9. Stapelfeldt, K., Roberge, A., Mandell., A., & Rauer, H. (2021). "Space Missions for Exoplanets", In *ExoFrontiers: Big questions in exoplanetary science* (ed. N. Madhusudhan), Institute of Physics Publishing, ISBN 978-0-7503-1470-1, doi:10.1088/2514-3433/abfa8fch9

8. Quick, L. C., Roberge, A., Mlinar, A. B., & Hedman, M. M. (2020). "Forecasting Rates of Volcanic Activity on Terrestrial Exoplanets and Implications for Cryovolcanic Activity on Extrasolar Ocean Worlds." Publications of the Astronomical Society of the Pacific, 132, 084402

7. Roberge, A. & Moustakas, L. A. (2018). "The Large Ultraviolet/Optical/Infrared Surveyor." Nature Astronomy, 2, 605

6. Roberge, A. & Seager, S. (2018). "The 'Spectral Zoo' of Exoplanet Atmospheres." In *Handbook of Exoplanets* (eds. H. J. Deeg & J. A. Belamonte), Springer International Publishing, ISBN 978-3-319-30648-3, doi:10.1007/978-3-319-30648-3_98-1

5. Roberge, A., Rizzo, M. J., Lincowski, A. P., et al. (2017). "Finding the Needles in the Haystacks: High-Fidelity Models of the Modern and Archean Solar System for Simulating Exoplanet Observations." Publications of the Astronomical Society of the Pacific, 129, 124401

4. Stark, C. C., Roberge, A., Mandell, A., et al. (2015). "Lower Limits on Aperture Size for an ExoEarth Detecting Coronagraphic Mission." The Astrophysical Journal, 808, 149

3. Dent, W. R. F., Wyatt, M. C., Roberge, A., et al. (2014). "Molecular Gas Clumps from the Destruction of Icy Bodies in the β Pictoris Debris Disk." Science, 343, 1490

2. Roberge, A., Chen, C. H., Millan-Gabet, R., et al. (2012). "The Exozodiacal Dust Problem for Direct Observations of ExoEarths." Publications of the Astronomical Society of the Pacific, 124, 799

1. Roberge, A., Feldman, P. D., Weinberger, A. J., et al. (2006). "Stabilization of the β Pictoris Disk by Extremely Carbon-Rich Gas." Nature, 441, 724