Dr Johanna M. Vos

Postdoctoral Fellow
American Museum of Natural History
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Current Position

American Museum of Natural History — 2018 – Present
Postdoctoral Fellow

Education

Institute for Astronomy, University of Edinburgh — 2014-2018
PhD in Astronomy
Thesis: "Characterising Weather and Rotation on Substellar Worlds"
Advisor: Dr Beth A. Biller

Trinity College Dublin — 2010-2014
BA (Mod) Physics with Astrophysics
Graduated with First Class Honours
Thesis: "Sunspots and Solar Flares: The Role of Flows"
Advisor: Dr Peter T. Gallagher

Research Interests

Atmospheres of brown dwarf and giant exoplanets
Cloud-driven variability
Young brown dwarfs as exoplanet analogs

Awards

Cool Stars Travel Grant *August 2018*
Principal's Go Abroad Fund *University of Edinburgh, June 2018*
Exoclipse Travel Grant *August 2017*
Principal's Career Development Scholarship *University of Edinburgh, 2014–2018*
First-Class Book Prize *Trinity College Dublin, 2011, 2012, 2013*

Telescope Time Awarded

A case study for JWST: Disentangling auroral and cloud variability in early L dwarfs — 2019
Hubble Space Telescope (16 orbits) & Very Large Array (27.6 hr), ***PI****.*

Spatial Cloud Map of a Planetary-Mass Companion — 2019
Spitzer Space Telescope Director's Discretionary Time, 33.1 hr, ***PI****.*

Weather and Rotation of Young Brown Dwarfs — 2018
Spitzer Space Telescope Medium Program, 70 hr, ***PI***

Rotational Velocities of Exoplanet Analogs — 2016-2018
NASA Gemini/GNIRS and IRTF/iSHELL program, 10 nights, ***PI***

Wind Speeds on Extrasolar Worlds — 2016-2018
Spitzer Space Telescope (30.8 hr) & Very Large Array (33 hr), Co-I

Exometeorology: Characterising Weather on a Young, Free-Floating Planet — 2016
Hubble Space Telescope (5 orbits) & Spitzer Space Telescope (17.6 hr), Co-I

The First Search for Exoplanet Weather — 2014-2017
ESO New Technology Telescope, 29 nights, ***PI***

Presentations

Variability on Young Brown Dwarfs 2019
Contributed Talk, Other Worlds Laboratory, UC Santa Cruz, CA, USA

Weather and Rotation on Substellar Worlds 2019
Seminar, American Museum of Natural History, NY, USA

Detecting Weather Patterns on Low-Gravity Brown Dwarfs 2019
Oral Presentation, AAS 233, Seattle, WA, USA

Weather Patterns on Exoplanet Analogs 2018
Plenary Talk, Cool Stars 20, Boston, MA, USA

The Viewing Angle of Exoplanet Analogues Influences Their Observed Colours and Amplitudes 2017
Contributed Talk, Exoclipe, Boise, ID, USA

Testing the Effect of Viewing Angle on the Observed Properties of Brown Dwarfs and Exoplanet Analogues 2017
Contributed Talk, Scottish Exoplanet and Brown Dwarf Meeting, University of Edinburgh, UK

The First Search for Weather Patterns on Exoplanet Analogues 2017
Invited Talk, European Southern Observatories, Santiago, Chile

The First Search for Exoplanet Weather 2016
Poster, UK Exoplanet Meeting, University of Exeter, UK
Poster, Cool Stars 19, Uppsala University, Sweden

The First Search for Exoplanet Weather 2015
Contributed Talk, Scottish Exoplanet and Brown Dwarf Meeting, St Andrews, UK

Workshops Attended

Other Worlds Laboratory
University of California, Santa Cruz, July 2019

Multi-Dimensional Characterization of Distant Worlds
University of Michigan, October 2018

Teaching Experience

Student Research Mentoring Program, AMNH 2018-Present

Mentor
The Student Research Mentoring Program (SRMP) offers high-school students the opportunity to join ongoing research with scientists at the American Museum of Natural History. I meet with three students twice a week to work on a research project. At the end of the year my students will present a poster, give a research talk and prepare a scientific paper on their project.

After School Program, AMNH 2019-Present

Instructor
Stars – An after school research course for high-school students in NYC.

University of Edinburgh 2014-2018

Teaching Assistant 2014-2015
Maths for Physics
Introductory Astrophysics
– TA duties included leading tutorials and workshops as well as grading assignments.

Head Teaching Assistant 2015-2018

Physics Experimental Lab
Observational Astronomy Lab
– In additional to regular duties, as Head TA I maintained and developed new and existing lab experiments. I also co-supervised a senior undergraduate student, who developed supporting resources for the lab.

Service

Time Allocation Committe Member 2019
NASA

Referee 2018
The Astrophysical Journal

Astrophysics Seminar Organizer 2018-present
American Museum of Natural History

Astronomy Representative 2017-2018
Postgraduate Forum, The University of Edinburgh

Astronomy Postgraduate Committee Member 2015-2016
The University of Edinburgh

Outreach Activities

StemEast, UK & Ireland 2014-2018
STEM Ambassador
As a STEM Ambassador I gave talks and workshops in secondary schools around Ireland and Scotland about astrophysics research and studying STEM subjects at university.

Royal Observatory of Edinburgh Winter Talk Series 2018
Speaker, "The Exoplanet-Brown Dwarf Connection"

Women are Boring 2018
Contributor, "Searching for Weather Patterns on Free-Floating Worlds"

Pint of Science Festival 2017
Speaker, "Whatever the Weather"

Edinburgh University Science Magazine 2017
Contributor, "Fingerprints From the Birth of the Universe"

Kickstart Summer Programme 2015-2016
Workshop Leader
Kickstart is a programme designed to give secondary students a taster of what university has to offer. In the summers of 2015 and 2016 I led a workshop covering some of the topics involved in a physics degree.

Edinburgh International Science Festival 2015
Event Assistant
Managed the University of Edinburgh family programme at the Edinburgh International Science Festival at the National Museum of Scotland.

Refereed Publications

Johanna M. Vos, Beth A. Biller, Mariangela Bonavita, Simon Eriksson, Michael C. Liu, William M. J. Best, Stanimir Metchev, Jacqueline Radigan, Katelyn N. Allers, Markus Janson, Esther Buenzli, Trent J. Dupuy, Mickaël Bonnefoy, Elena Manjavacas, Wolfgang Brandner, Ian Crossfield, and Joshua Schlieder. *"A Search for Variability in Exoplanet Analogues and Low-Gravity Brown Dwarfs." Monthly Notices of the Royal Astronomical Society,* 483:480-502, 2019.

Johanna M. Vos, Katelyn N. Allers, Beth A. Biller, Michael C. Liu, Trent J. Dupuy, Jack F. Gallimore, Iyadunni J. Adenuga, and William M. J. Best. *"Variability of the*

lowest mass objects in the AB Doradus moving group." Monthly Notices of the Royal Astronomical Society, 474(1):10411053, 2018.

Beth A. Biller, **Johanna M. Vos**, Esther Buenzli, Katelyn Allers, Mickaël Bonnefoy, Benjamin Charnay, Bruno Bézard, France Allard, Derek Homeier, Mariangela Bonavita, Wolfgang Brandner, Ian Crossfield, Trent Dupuy, Thomas Henning, Taisiya Kopytova, Michael C. Liu, Elena Manjavacas, and Joshua Schlieder. *"Simultaneous Multiwavelength Variability Characterization of the Free-floating Planetary-mass Object PSO J318.5–22." The Astronomical Journal*, 155(2):95, 2018.

Johanna M. Vos, Katelyn N. Allers, and Beth A. Biller. *"The Viewing Geometry of Brown Dwarfs Influences Their Observed Colors and Variability Amplitudes." The Astrophysical Journal*, 842(2):78, 2017.

Beth A. Biller, **Johanna M. Vos**, Mariangela Bonavita, Esther Buenzli, Claire Baxter, Ian J.M. Crossfield, Katelyn Allers, Michael C. Liu, Mickaël Bonnefoy, Niall Deacon, Wolfgang Brandner, Joshua E. Schlieder, Trent Dupuy, Taisiya Kopytova, Elena Manjavacas, France Allard, Derek Homeier, and Thomas Henning. *"Variability in a young, L/T transition planetary-mass object." Astrophysical Journal Letters*, 813(2):16, 2015.

White Papers

Johanna M. Vos, Katelyn Allers, Daniel Apai, Beth Biller, Adam Burgasser, Jacqueline Faherty, Jonathan Gagné, Christiane Helling, Caroline Morley, Jacqueline Radigan, Adam Showman, Xianyu Tan, Pascal Tremblin *"Astro2020 Science White Paper: The L/T Transition"*, 2019.

Adam Burgasser, Daniel Apai, Daniella Bardalez Gagliuffi, Cullen Blake, Jonathan Gagné, Quinn Konapacky, Emily Martin, Stanimir Metchev, Peter Plavchan, Ansgar Reiners, Everett Schlawin, Clara Sousa-Silva, **Johanna M. Vos** *"Astro2020 Science White Paper: High-Resolution Spectroscopic Surveys of Ultracool Dwarf Stars & Brown Dwarfs"*, 2019.

Jacqueline Faherty, Katelyn Allers, Daniella Bardalez Gagliuffi, Adam Burgasser, Jonathan Gagné, John Gizis, J. Davy Kirkpatrick, Adric Riedel, Adam Schneider, **Johanna M. Vos** *"Astro2020 Science White Paper: Brown Dwarfs and Directly Imaged Exoplanets in Young Associations"*, 2019.

Adam Burgasser, Isabelle Baraffe, Matthew Browning, Adam Burrows, Gilles Chabrier, Michelle Creech-Eakman, Brice Demory, Sergio Dieterich, Jacqueline Faherty, Daniel Huber, Nicolas Lodieu, Peter Plavchan, R. Michael Rich, Didier Saumon, Keivan Stassun, Amaury Triaud, Gerard van Belle, Valerie Van Grootel, **Johanna M. Vos**, Rakesh Yadav *"Astro2020 Science White Paper: Fundamental Physics with Brown Dwarfs: The Mass-Radius Relation"*, 2019.