# Dr Johanna M. Vos

Postdoctoral Fellow
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**Professional Appointments**

**Postdoctoral Fellow** 2018 – Present
Department of Astrophysics, American Museum of Natural History
Advisor: Dr Jacqueline Faherty

**Education**

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

**Trinity College Dublin** 2010-2014
*BA (Mod) Physics with Astrophysics*
Graduated with First Class Honours

**Research Interests**

Atmospheres of brown dwarfs and extrasolar planets
Spectroscopic variability monitoring from ground and space
Disentangling clouds, aurorae and magnetic atmospheric phenomena

**Grants & Awards**

Hubble Space Telescope General Observer Grant, STSci, **PI** 2019
NASA Exoplanets Research Program (XRP), Co-I 2019
Other Worlds Lab, UC Santa Cruz, *Heising-Simons Foundation* 2019
Cool Stars 20 Conference Grant, *Boston University* 2018
Winton Thesis Prize, *University of Edinburgh* 2018
Principal's Go Abroad Fund, *University of Edinburgh* 2018
Exoclipse Conference Grant, *Boise State University* 2017
Principal's Career Development Scholarship, *University of Edinburgh* 2014
First Class Book Prize, *Trinity College Dublin* 2011, 2012, 2013

**Invited Talks and Seminars**

Invited Colloquium, Center for Space and Habitability, University of Bern 2021
Invited Colloquium, Trinity College Dublin 2021
Invited Colloquium, University of Texas at Austin 2021
Invited Colloquium, Center for Computational Astrophysics, Flatiron Institute 2020
Invited Colloquium, NASA/Goddard Space Flight Center 2020
Invited Talk, Brown Dwarf to Exoplanet Connection, University of Delaware 2019
Invited Colloquium, Dublin Institute for Advanced Studies 2019
Invited Colloquium, American Museum of Natural History 2019
Invited Colloquium, Royal Observatory of Edinburgh 2017
Invited Talk, European Southern Observatories, Santiago, Chile 2017

**Conference Talks**

Contributed Talk, American Astronomical Society Meeting 237 2021
Contributed Talk, Exo-Webb Seminar Series 2020
Contributed talk, American Astronomical Society Meeting 235, Honolulu, HI 2020
Contributed Talk, Other Worlds Laboratory, UC Santa Cruz, CA 2019
Dissertation Talk, American Astronomical Society Meeting 233, Seattle, WA 2019
Plenary Talk, Cool Stars 20, Boston, MA 2018

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| | Contributed Talk, Exoclipe, Boise, ID | 2017 |
| | Contributed Talk, Scottish Exoplanet and Brown Dwarf Meeting | 2017 |
| **Conference Posters** | Poster, 2021 STScI Spring Symposium, Virtual | 2021 |
| | Poster and Haiku, Cool Stars 20.5, Virtual | 2021 |
| | Poster, Exoplanets 3, Virtual | 2020 |
| | Poster, Royal Astronomical Society Early Career Researcher Exhibition, Virtual | 2020 |
| | Poster, Extreme Solar Systems IV, Reykjavik, Iceland | 2019 |
| | Poster, Cool Stars 19, Uppsala, Sweden | 2016 |
| | Poster, UK Exoplanet Meeting, University of Exeter, UK | 2016 |
| | Poster, UK Exoplanet Meeting, University of Warwick, UK | 2015 |
| **Workshops Attended** | Tackling the Complexities of Substellar Objects, *Lorentz Centre* | 2020 |
| | Other Worlds Laboratory, *University of California Santa Cruz* | 2019 |
| | Multi-Dimensional Characterization of Distant Worlds, *U of Michigan* | 2019 |
| **Selected Telescope Time** | Gemini-N/GNIRS & Gemini-S/IGRINS (30 hr), **PI** | 2020 |
| | Hubble Space Telescope (16 orbits) & Very Large Array (27.6 hr), **PI** | 2019 |
| | Gemini-S/IGRINS, 31 hr, **PI** | 2019-2021 |
| | Spitzer Space Telescope Director's Discretionary Time, 33.1 hr, **PI** | 2019 |
| | Spitzer Space Telescope Medium Program, 70 hr, **PI** | 2018 |
| | James Webb Space Telescope Early Release Science, 39 hr, Collaborator | 2017 |
| | Gemini-S/GNIRS and IRTF/iSHELL program, 10 nights, **PI** | 2016-2018 |
| | Spitzer Space Telescope (30.8 hr) & Very Large Array (33 hr), Co-I | 2016-2018 |
| | Hubble Space Telescope (5 orbits) & Spitzer Space Telescope (17.6 hr), Co-I | 2016 |
| | ESO New Technology Telescope, 29 nights, **PI** | 2014-2017 |
| **Teaching** | **Instructor** | 2019-2020 |
| | Stars - After School Program, AMNH | |
| | **Research Mentor** | 2018-Present |
| | Science Research Mentoring Program, AMNH | |
| | **Head Teaching Assistant** | 2016-2018 |
| | Physics 1B Experimental Lab, University of Edinburgh | |
| | Observational Astronomy Lab, University of Edinburgh | |
| | **Teaching Assistant** | 2014-2018 |
| | Maths for Physics 1, University of Edinburgh | |
| | Introductory Astrophysics, University of Edinburgh | |
| **Research Mentoring** | **Undergraduate Students** | |
| | Jose Adorno (Queen's College, now at NASA Goddard) | 2020 |
| | Allison McCarthy (University of Alabama, now at Boston University) | 2019 |
| | **High-school students** | |
| | Azul Ruiz Diaz (Brooklyn Technical High School) | 2020 |
| | Jai Glazer (The Dalton School) | 2020 |
| | Sophia Ameneyo Fourcade (University Neighborhood High School) | 2020 |
| | Izzy Lapidus (Fiorello H. LaGuardia High School) | 2019 |
| | Otis McCallum (The Beacon School) | 2019 |
| | William McCartney (New Explorations Into Science and Technology + Math) | 2019 |
| | Elko Gerville-Reache (School of The Future) | 2018 |
| | Raunak Amanna (Brooklyn Technical High School) | 2018 |
| | Nima Brivanlou (Lycée Français de New York) | 2018 |

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| **Service** | Journal Referee, ApJ, ApJL, AJ | 2019-Present |
| | External reviewer for national grant allocation | 2021 |
| | Time Allocation Committee member for space-based observatory | 2020 |
| | Time Allocation Committee member for ground-based observatory | 2019-2020 |
| | Scientific Organizing Committee member, CloudCon, U of Heidelberg | 2021 |
| | Astrophysics Seminar Organizer, American Museum of Natural History | 2018-2020 |
| | Astronomy Representative, Postgraduate Forum, U of Edinburgh | 2017-2018 |
| **Selected Outreach Activities** | Question Moderator, AMNH Astronomy Online Programs | 2020-2021 |
| | Speaker, STEM to SHTEM Internship Program, Stanford University | 2020 |
| | Featured Scientist, Million STEM | 2020 |
| | Speaker, Harlem Academy | 2020 |
| | Speaker, Westport Astronomical Society | 2019 |
| | Speaker, BridgeUP: STEM, AMNH | 2019 |
| | Speaker, Royal Observatory of Edinburgh Winter Talk Series | 2018 |
| | Contributor, Women are Boring | 2018 |
| | Speaker, Pint of Science Festival, Edinburgh UK | 2017 |
| | Contributor, Edinburgh University Science Magazine | 2017 |
| | Speaker, Loreto College Dublin | 2016 |
| | Speaker, Royal Observatory of Edinburgh Open Day | 2016 |
| | Workshop leader, University of Edinburgh Kickstart Program | 2015-2016 |
| | Speaker, Women in Physics Event, Preston Lodge High School, Edinburgh | 2015 |
| | Event Assistant, Edinburgh International Science Festival | 2015 |
| | STEM Ambassador, StemEast | 2014-2018 |
| | Mentor, Transition Year Physics Experience Program, Trinity College Dublin | 2012 |
| **Selected Media/Press** | Irish Times Research Lives Interview | 2020 |
| | Brown dwarf stars: What's the weather like up there? | |
| | NRAO's 2020 Astronomy Highlights with Phil Plait | 2020 |
| | Measuring the Wind Speed of a Brown Dwarf a Quadrillion Miles Away | |
| | Space.com Science & Astronomy Interview | 2020 |
| | How the brown dwarf blows: Wind speed of a 'failed star' measured for 1st time | |
| | New Scientist Space Research Highlights | 2015 |
| | Molten metal storms rage on orphan planet that lost its star | |

**First Author Publications**

* denotes equal author contribution

1. A measurement of the wind speed on a brown dwarf
   Allers*, K. N.; **Vos*, J. M.**; Biller*, B. A.; Williams*, P. K.G. *Science,* 368, 6487, 169-172, 2020.
2. Spitzer Variability Properties of Young Giant Planet Analogs
   **Vos, J. M.**; Biller, B. A.; Allers, K. N.; Faherty, J. K.; Liu, Michael C.; Eriksson, S.; Best, W. M. J.; Metchev, S.; Radigan, J.; Allers, K. N.; Janson, M.; Buenzli, E.; Dupuy, T. J.; Bonnefoy, M.; Manjavacas, E.; Brandner, W.; Crossfield, I.; Deacon, N.; Henning, T.; Homeier, D.; Schlieder, J., *The Astronomical Journal,* 160(1):38, 2020.
3. A Search for Variability in Exoplanet Analogues and Low-Gravity Brown Dwarfs.
   **Vos, J. M.**; Biller, B. A.; Bonavita, M.; Eriksson, S.; Liu, Michael C.; Best, W. M. J.; Metchev, S.; Radigan, J.; Allers, K. N.; Janson, M.; Buenzli, E.; Dupuy, T. J.; Bonnefoy, M.; Manjavacas, E.; Brandner, W.; Crossfield, I.; Deacon, N.;

Henning, T.; Homeier, D.; Kopytova, T. Schlieder, J., *Monthly Notices of the Royal Astronomical Society,* 483:480-502, 2019.

4. Variability of the lowest mass objects in the AB Doradus moving group.
**Vos, J. M.**; Allers, K.. N.; Biller, B. A.; Liu, M. C.; Dupuy, T. J.; Gallimore, J. F.; Adenuga, I. J.; Best, W. M. J., *Monthly Notices of the Royal Astronomical Society*, 474(1):10411053, 2018.

5. The Viewing Geometry of Brown Dwarfs Influences Their Observed Colors and Variability Amplitudes
**Vos, J. M.**; Allers, K. N.; Biller, B. A., *The Astrophysical Journal*, 842(2):78, 2017.

**Co-Author Publications**

6. Revealing the Vertical Cloud Structure of an AB Pictoris b Analog through Keck I/MOSFIRE spectro-photometric variability
Manjavacas, E.; Karalidi, T.; **Vos, J. M.**; Biller, B. A.; Lew, B. W. P, submitted to *The Astronomical Journal*

7. Longitudinally Resolved Spectral Retrieval (ReSpect) of WASP-43b
Cubillos, P. E.; Keating, D.; Cowan, N. B.; **Vos, J. M.**; Burningham, B.; Ygouf, M.; Karalidi, T.; Zhou, Y.; Gonzales, E. C., submitted to *The Astrophysical Journal*

8. A High-Contrast Search for Variability in HR 8799bc with VLT-SPHERE
Biller, B. A.; Apai, D.; Bonnefoy, M.; Desidera, S.; Gratton, R.; Kasper, M.; Kenworthy, M.; Lagrange, A.; Lazzoni, C.; Mesa, D.; Vigan, A.; **Vos, J. M.**; Wagner, K.; Zurlo, A., accepted for publication in *Monthly Notices of the Royal Astronomical Society*

9. Simultaneous Multiwavelength Variability Characterization of the Free-floating Planetary-mass Object PSO J318.5–22.
Biller, B. A.; **Vos, J. M.**; Buenzli, E.; Allers, K.; Bonnefoy, M.; Charnay, B.; Bézard, B.; Allard, F.; Homeier, D.; Bonavita, M.; Brandner, W.; Crossfield, I.; Dupuy, T.; Henning, T.; Kopytova, T.; Liu, M. C.; Manjavacas, E.; Schlieder, J., *The Astronomical Journal*, 155(2):95, 2018.

10. Variability in a young, L/T transition planetary-mass object
Biller, B. A.; **Vos, J. M.**; Bonavita, M.; Buenzli, E.; Baxter, C.; Crossfield, I. J. M.; Allers, K.; Liu, M. C.; Bonnefoy, M.; Deacon, N.; Brandner, W.; Schlieder, J. E.; Dupuy, T.; Kopytova, T.; Manjavacas, E.; Allard, F.; Homeier, D.; Henning, T., *The Astrophysical Journal Letters*, 813(2):16, 2015.

**Selected White Papers & Research Notes**

11. A Tool and Workflow for Radio Astronomical Peeling in CASA
Williams, P. K. G.; Allers, K. N.; Biller, B. A.; **Vos, J. M.**, *Research Notes of the American Astronomical Society*, 3, 110, 2019.

12. The L/T Transition
**Vos, J. M.**; Allers, K.; Apai, D.; Biller, B.; Burgasser, A. J.; Faherty, J.; Gagne, J.; Helling, C.; Morley, C.; Radigan, J.; Showman, A.; Tan, .; Tremblin, P., Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.

13. Mapping Ultracool Atmospheres: Time-domain Observations of Brown Dwarfs and Exoplanets
Apai, D.; Biller, B.; Burgasser, A.; Girard, J. H.; Gizis, J. E.; Karalidi, T.;

Kraus, Ad. L.; Lew, B. W. P.; Manjavacas, E.; Marley, M.; Miles-Paez, P. A.; Morley, C. V.; Radigan, J.; **Vos, J. M.**; Zhou, Y., Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.

14. Brown Dwarfs and Directly Imaged Exoplanets in Young Associations
Faherty, J.; Allers, Katelyn; Bardalez Gagliuffi, D.; Burgasser, A. J.; Gagne, J.; Gizis, J.; Kirkpatrick, J. D.; Riedel, A.; Schneider, A.; **Vos, J. M.**, Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.

15. High-Resolution Spectroscopic Surveys of Ultracool Dwarf Stars & Brown Dwarfs
Burgasser, A.; Apai, D.; Bardalez-Gagliuffi, D.; Blake, C.; Gagne, J.; Konopacky, Q.; Martin, E.; Metchev, S.; Plavchan, P;, Reiners, A.; Schlawin, E.; Sousa-Silva, C.; **Vos, J. M.**, Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.

16. Fundamental Physics with Brown Dwarfs: The Mass-Radius Relation
Burgasser, A.; Baraffe, I.; Browning, M.; Burrows, A.; Chabrier, G.; Creech-Eakman, M.; Demory, B.; Dieterich, S.; Faherty, J.; Huber, D.; Lodieu, N.; Plavchan, P.; Michael Rich, R.; Saumon, D.; Stassun, K.; Triaud, A.; van Belle, G.; van Grootel, V.; **Vos, J. M.**, Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.

17. IDEAS: Immersive Dome Experiences for Accelerating Science
Faherty, Ja.; SubbaRao, M.; Wyatt, R.; Ynnerman, A.; de Grasse Tyson, N.; Geller, A.; Weber, M.; Rosenfield, P.; Steffen, W.; Stoeckle, G.; Weiskopf, D.; Magnor, M.; Williams, P. K. G.; Abbott, B.; Marchetti, L.; Jarrett, T.; Fay, J.; Peek, J.; Graur, O.; Durrell, P. H., Derek; P., Heather; Mller, T.; **Vos, J. M.**; Brown, David; Giorla Godfrey, P.; Rice, E.; Bardalez Gagliuffi, D.; Bock, A., Astro2020 Science White Paper, *Bulletins of the American Astronomical Society*, 2019.