Dr Johanna M. Vos

Postdoctoral Fellow
American Museum of Natural History
johannavos.github.io
jvos@amnh.org

Professional Appointments

Department of Astrophysics, 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, Ireland 2010-2014
BA (Mod) Physics with Astrophysics
Graduated with First Class Honours

Research Interests

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

Grants & Awards

A case study for JWST: Disentangling Auroral and Cloud Variability 2019
Hubble Space Telescope General Observer Grant, STSci, **PI**
A Search for Transiting Exoplanets and Exomoons Orbiting L and T Dwarfs 2019
NASA Exoplanets Research Program (XRP), Co-I
Other Worlds Lab, UC Santa Cruz *Heising-Simons Foundation* 2019
Cool Stars Conference Grant,*Uppsala University* 2018
Winton Astronomy 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

Telescope Time

The Young and the Restless: Constraining the Viewing Angles of Young, Cloudy Brown Dwarfs 2020
Gemini-N/GNIRS & Gemini-S/IGRINS (1.5 n), ***PI***

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***

Mapping Atmospheric Structures in Brown Dwarfs 2019-2020
Gemini/IGRINS, 31 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***

High Contrast Imaging of Exoplanets and Exoplanetary Systems with JWST 2017
James Webb Space Telescope Early Release Science, 39 hr, Collaborator

Rotational Velocities of Exoplanet Analogs 2016-2018
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***

Selected Invited / Conference Talks

Let The Great World Spin: Revealing the Turbulent, Stormy Atmospheres of Giant Planet Analogs 2020
Seminar, Center for Computational Astrophysics, Flatiron Institute, NY, USA

Probing Cloudy Atmospheres: Lessons for the JWST Era 2020
Contributed Talk, Exo-Webb Seminar Series

Characterising Cool Atmospheres with Variability Monitoring 2020
Seminar, NASA/Goddard Space Flight Center, MD, USA

Young L Dwarf Variability in the Mid-IR 2020
Contributed talk, American Astronomical Society Meeting 235, Honolulu, HI, USA

Probing the Turbulent Atmospheres of Young Giant Planet Analogs 2019
Invited Talk, BDEXOCON, University of Delaware, USA

Weather and Rotation on Substellar Worlds 2019
Seminar, Dublin Institute for Advanced Studies, Ireland

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
Dissertation Talk, American Astronomical Society Meeting 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

Teaching & Mentoring

AstroCom NYC, City University of New York 2020
Advising: Jose Adorno (Queen's College, City University of New York '21)

NSF Research Experiences for Undergraduates (REU), AMNH 2019
Advised: Allison McCarthy (University of Alabama '20)
Current position: Graduate student at Boston University

Science Research Mentoring Program, AMNH 2019-Present
Research mentor for three high-school students each year

After School Program, AMNH 2019-2020
Astronomy Instructor

University of Edinburgh 2014-2018
Teaching Assistant 2014-2016
Maths for Physics 1
Introductory Astrophysics

Head Teaching Assistant 2016-2018
Physics 1B Experimental Lab
Observational Astronomy Lab

Service

Referee 2019-Present
ApJ, ApJL, AJ

Telescope Proposal Reviewer 2019-Present
Ground and space-based missions

Astrophysics Seminar Organizer 2018-2020
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

Selected Outreach Activities

AMNH Astronomy Online Programs 2020
Live Chat Moderator

STEM to SHTEM Summer Internship Program, Stanford University 2020
Speaker, "Let The Great World Spin: Revealing the Turbulent, Stormy Nature of Brown Dwarf Atmospheres"

Westport Astronomical Society 2019
Speaker, "The Brown Dwarf - Exoplanet Connection"

BridgeUP: STEM, AMNH 2019
Speaker, "Weather and Rotation on Extrasolar Worlds"

StemEast, UK & Ireland 2014-2018
STEM Ambassador

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

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 to *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.

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. Astro2020 Science White Paper: 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., *Bulletins of the American Astronomical Society*, 2019.

13. Astro2020 Science White Paper: 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., *Bulletins of the American Astronomical Society* 2019.

14. Astro2020 Science White Paper: 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.**, *Bulletins of the American Astronomical Society* 2019.

15. Astro2020 Science White Paper: 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.**, *Bulletins of the American Astronomical Society* 2019.

16. Astro2020 Science White Paper: 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.**, *Bulletins of the American Astronomical Society* 2019.

17. Astro2020 Science White Paper: 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., *Bulletins of the American Astronomical Society* 2019.