

# Johanna Vos

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## Current Position

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- **American Museum of Natural History, USA**

- *Postdoctoral Research Fellow*

2018–Present

Leading analysis of two Spitzer programs to detect mid-IR variability on young, free-floating planetary-mass objects.

## Education

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### Academic Qualifications.....

- **University of Edinburgh, UK**

- *PhD Astronomy, Supervisor: Dr Beth Biller*

2014–2018

Thesis Title: “*Characterising Weather and Rotation on Substellar Worlds*”

Lead the first survey for photometric variability in low-gravity brown dwarfs, revealing that they are more likely to be variable than their higher mass field brown dwarf counterparts.

Supplemented existing variability data with new Keck/NIRSPEC rotational velocities to investigate the trends between viewing geometry, variability amplitude and colour.

Combined Spitzer photometry and Keck/NIRSPEC spectra for three exoplanet analogues to study their variability properties and inclination angles.

- **Trinity College Dublin, Ireland**

- *BA (Mod) Physics with Astrophysics, First class honours*

2010–2014

Final Year Project: “*Sunspots and Solar Flares: The Role of Flows*”

Tracked the area and magnetic field strength of sunspot regions across the solar disk using Solar Dynamics Observatory data to establish a connection between these measurements and solar flare rates and strengths.

Used local correlation tracking codes on data taken from the Swedish Solar Telescope to determine horizontal velocities of the plasma in the lead up to a solar flare.

## Research Interests

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- Properties of brown dwarfs and giant exoplanets
- Cloud-driven variability
- Young brown dwarfs as exoplanet analogues

## Grants and Awards

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- **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

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- **Weather and Rotation on Young Brown Dwarfs**  
*Spitzer Medium Program, 70 hr, **PI*** 2018
- **Rotational Velocities of Exoplanet Analogues**  
*NASA Gemini/GNIRS and IRTF/iSHELL program, 10 nights, **PI*** 2016–2018
- **Wind Speeds on Extrasolar Worlds**  
*Spitzer Space Telescope, 30.8 hr & Very Large Array, 33 hr, Co-I* 2016–2018
- **Exometeorology: Characterising Weather on a Young, Free-Floating Planet**  
*Simultaneous Hubble and Spitzer observations, 17.6 hr, Co-I* 2016
- **The First Search for Exoplanet Weather**  
*ESO New Technology Telescope, 29 nights, **PI*** 2014–2017

## Selected Presentations

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- **Detecting Weather Patterns on Low-Gravity Brown Dwarfs** – Oral Presentation, AAS Winter Meeting 2019.
- **Weather Patterns on Exoplanet Analogues** – Plenary Talk, Cool Stars 20, 2018.
- **The Viewing Angle of Exoplanet Analogues Influences Their Observed Colours and Amplitudes** – Contributed Talk, Exoclipse, 2017.
- **Measuring Inclination Angles of Variable Brown Dwarfs** – Contributed Talk, Scottish Exoplanet and Brown Dwarf Meeting, 2017.
- **The First Search for Weather Patterns on Exoplanet Analogues** – Invited Talk, ESO Santiago, 2017.
- **The First Search for Exoplanet Weather** – Poster, Cool Stars 19, 2016.
- **The First Search for Exoplanet Weather** – Poster, UK Exoplanet Meeting, 2016.

## Teaching Experience

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- **Univeristy of Edinburgh**  
*Teaching Assistant* 2014–2018  
Lead undergraduate tutorials and labs for physics, astronomy and maths courses.

## Outreach Activities

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- **Student Research Mentoring Program** **American Museum of Natural History, NYC**  
○ *Mentor* 2018–Present  
The Student Research Mentoring Program offers high-school students the opportunity to join ongoing research with scientists at AMNH. I meet with students twice a week to analyse variability data of our closest brown dwarfs, Luhman 16AB.
- **StemEast** **UK & Ireland**  
○ *STEM Ambassador* 2014–2018  
As a STEM Ambassador, I have given talks in secondary schools around Ireland and Scotland about my research and studying STEM subjects at university.
- **Edinburgh University Science Magazine; Women are Boring; The King's Review**  
○ *Contributor* 2016–2018  
I have written numerous articles for publications explaining astronomical research and concepts to the general public.

## Publications

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- **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):1041–1053, 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):1–6, 2015.