A JWST MIRI Emission Spectrum of the Benchmark Hot Jupiter HD 189733b

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Image credit: ESO/M. Kornmesser
HD 189733 b

$T_{\text{eq}} = 1200 \text{ K}$

Mass $= 1.1 \ M_{\text{Jup}}$

Radius $= 1.1 \ R_{\text{Jup}}$

Jupiter

Image credit: ESO/M. Kornmesser
Evidence for aerosols in transit

Plot from Madhusudhan+ 2016
Original data: Pont+ 2013
Inglis+ (in prep)

Julie Inglis, Caltech

ExSoCal 5 Dec 11th, 2023

Slide 8
We see excess absorption from 8-9.5 microns

Models from Anna Gagnebin and Sagnick Mukherjee (in prep)

Inglis+ (in prep)
Photochemical models by Julie Moses
Mystery absorber?

**Gas Phase**
- Sulfur: $\text{H}_2\text{S}$, $\text{SO}_2$, $\text{OCS}$
- Hydrocarbons: $\text{HCN}$, $\text{C}_2\text{H}_2$, $\text{C}_2\text{H}_4$, $\text{C}_2\text{H}_6$
- $\text{O}_2$, $\text{H}_3^+$

**Low temperature**
- $\text{NH}_3$, $\text{N}_2\text{O}$, $\text{CH}_4$

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**Julie Inglis, Caltech**

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COMPOSITION OF CLOUD PARTICLES

Model spectrum based on Webb, Hubble, and Spitzer data

Light blocked by quartz ($SiO_2$) crystals

What the spectrum would look like with no quartz clouds

Amount of Light Blocked

Wavelength of Light (microns)
What’s Next?

2.4 - 28 um coverage over 50 science hours!

Transit:
- NIRCAM (GTO 1274, PI J. Lunine)
- MIRI LRS (GO 2021, PI B. Kilpatrick)

Eclipse:
- NIRCAM (GO 1633, PI D. Deming)
- MIRI LRS (GO 2001, PI M. Min)
- MIRI MRS (GO 163, PI D. Deming)

Eclipse map coming soon!
(See Maura Lally’s talk at AAS)

Image credit: ESO/M. Kornmesser