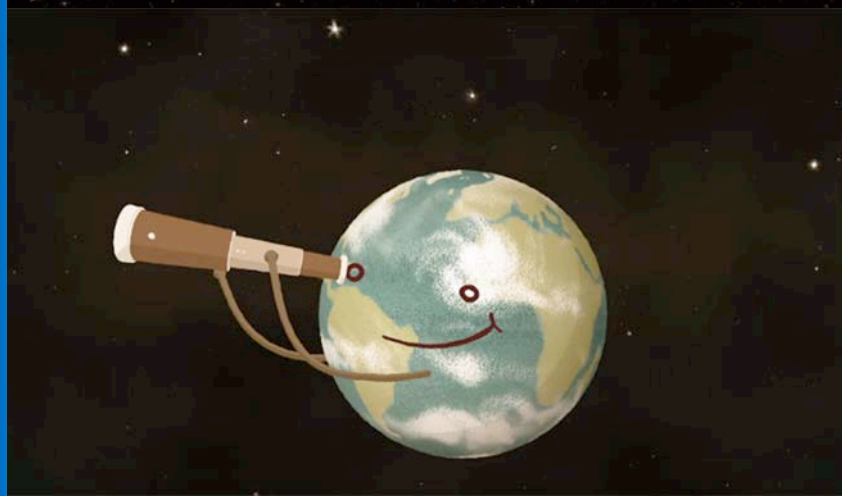
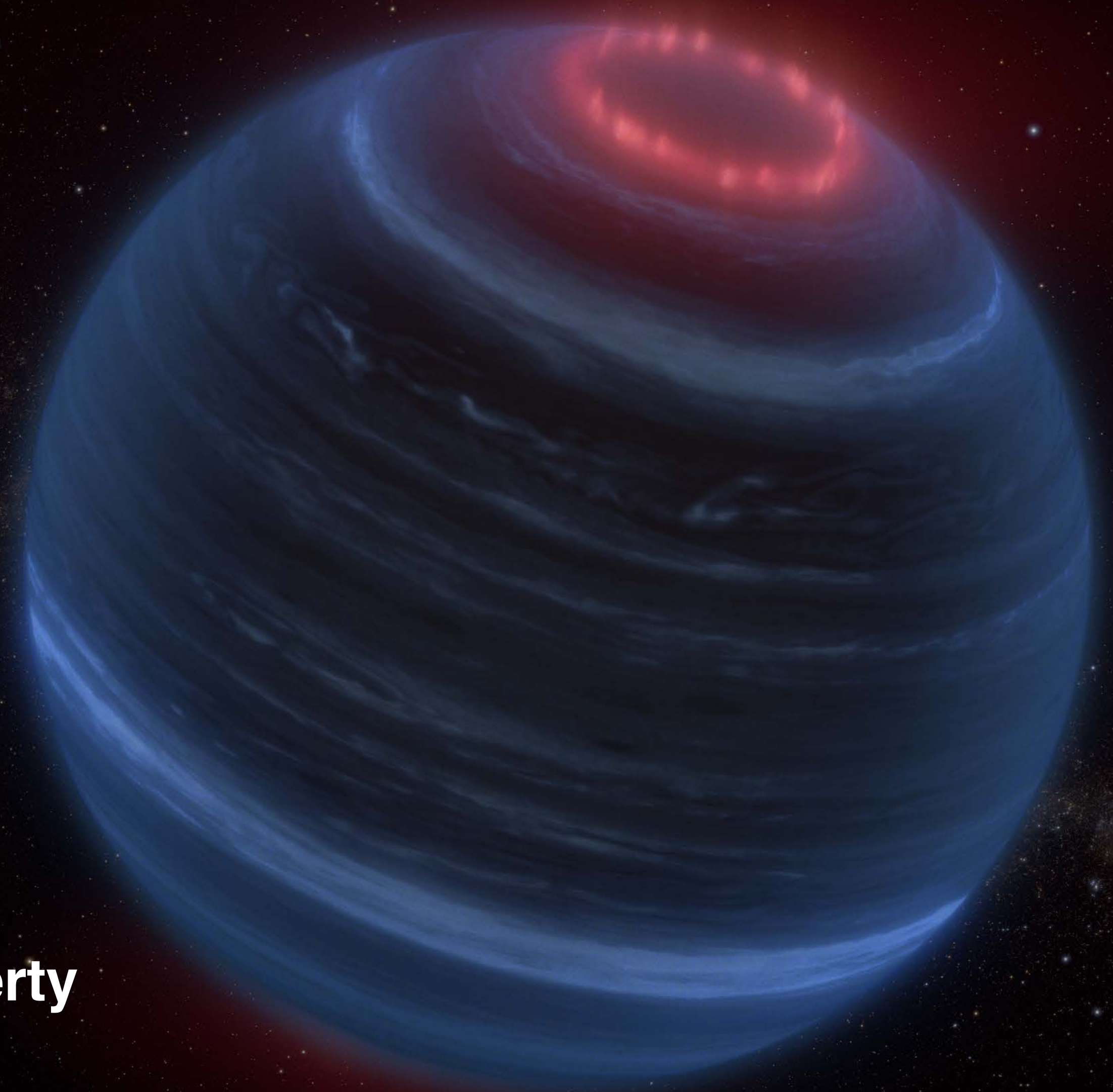


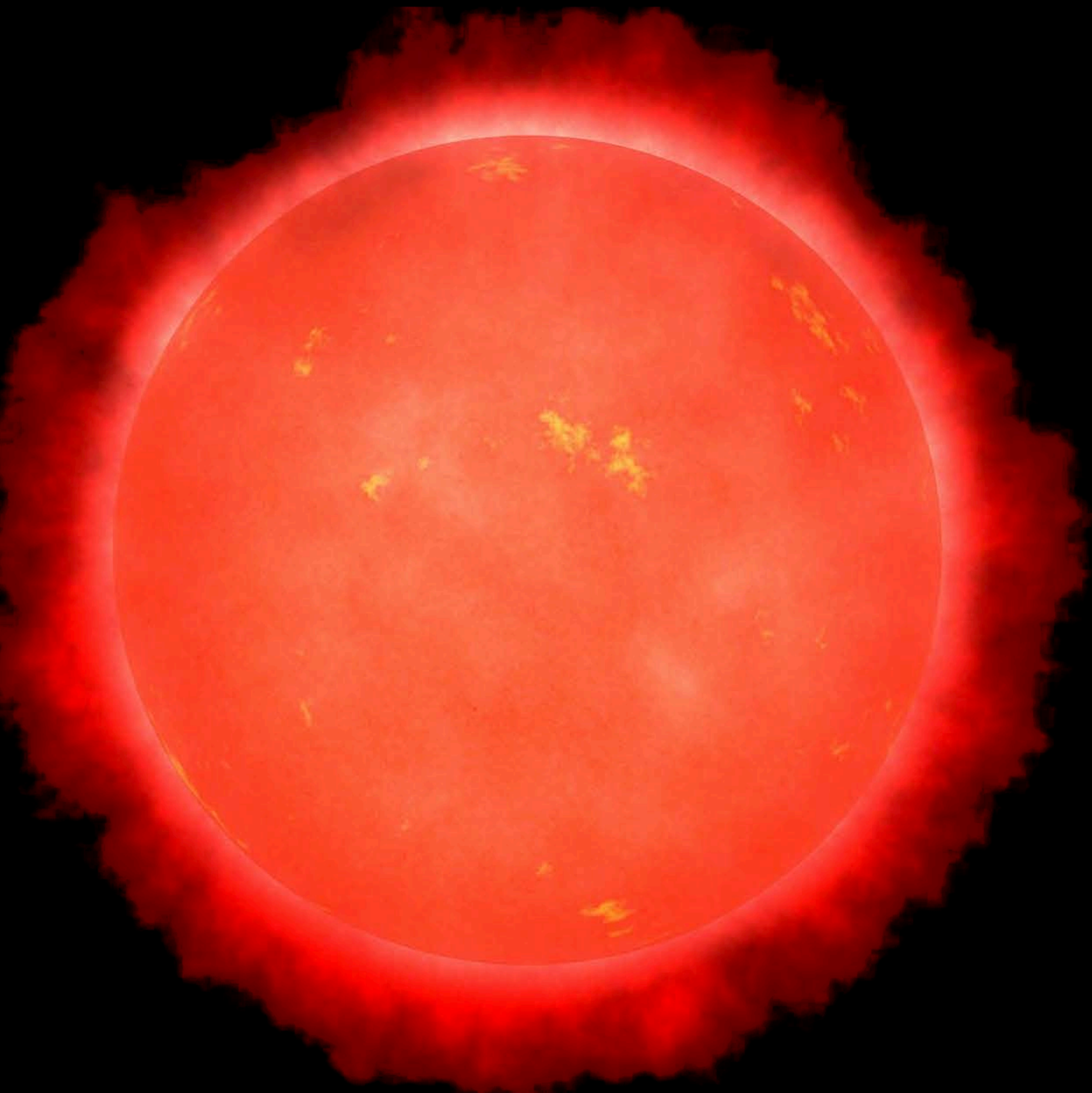
JWST Indicates Auroral Signature in a Cold Brown Dwarf



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Brown Dwarfs are Ideal Webb Targets

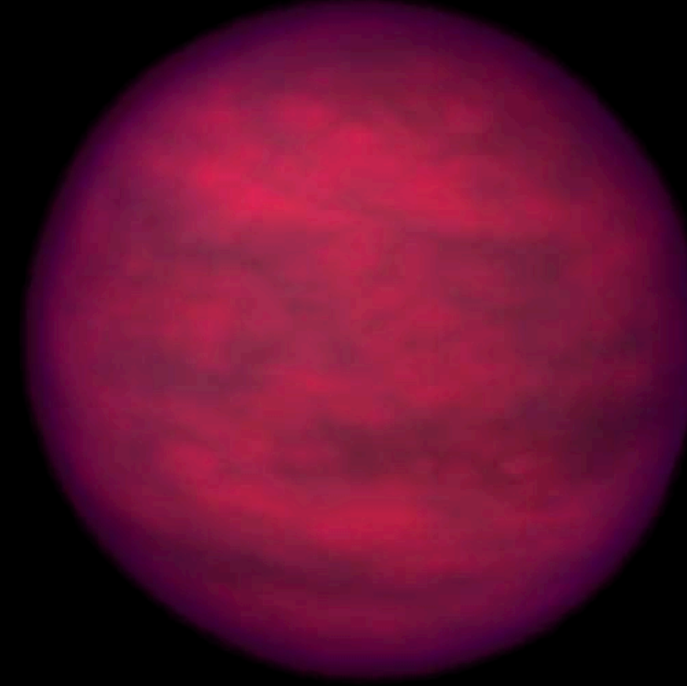


Low-mass Star

L



T



Y



Brown Dwarfs

Giant Planet

L Dwarfs
Surface Temp:
Pottery Kilns
Highest Setting

T Dwarfs
Surface Temp:
Lave Flows

Y Dwarfs
Surface Temp:
Conventional ovens
to cold day on the
North Pole



W1935

Discovered by
Citizen Scientist D.
Caselden working
with the Backyard
Worlds project

Distance: 14.43 +/- 0.79 pc

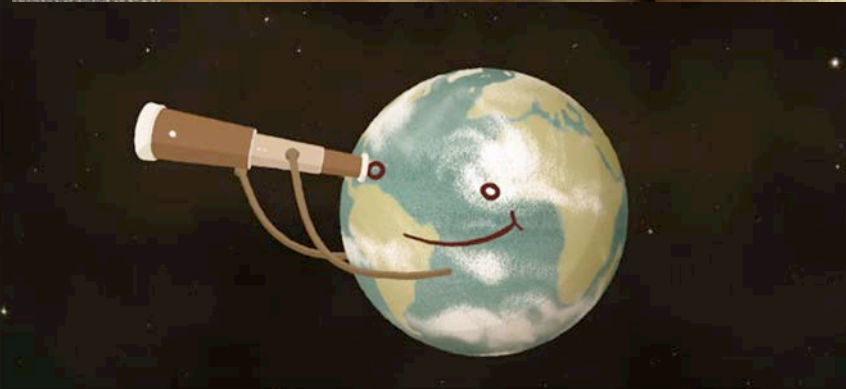
Temperature: ~482 K

Mass: 6 M_{Jup} - 35 M_{Jup}

W2220

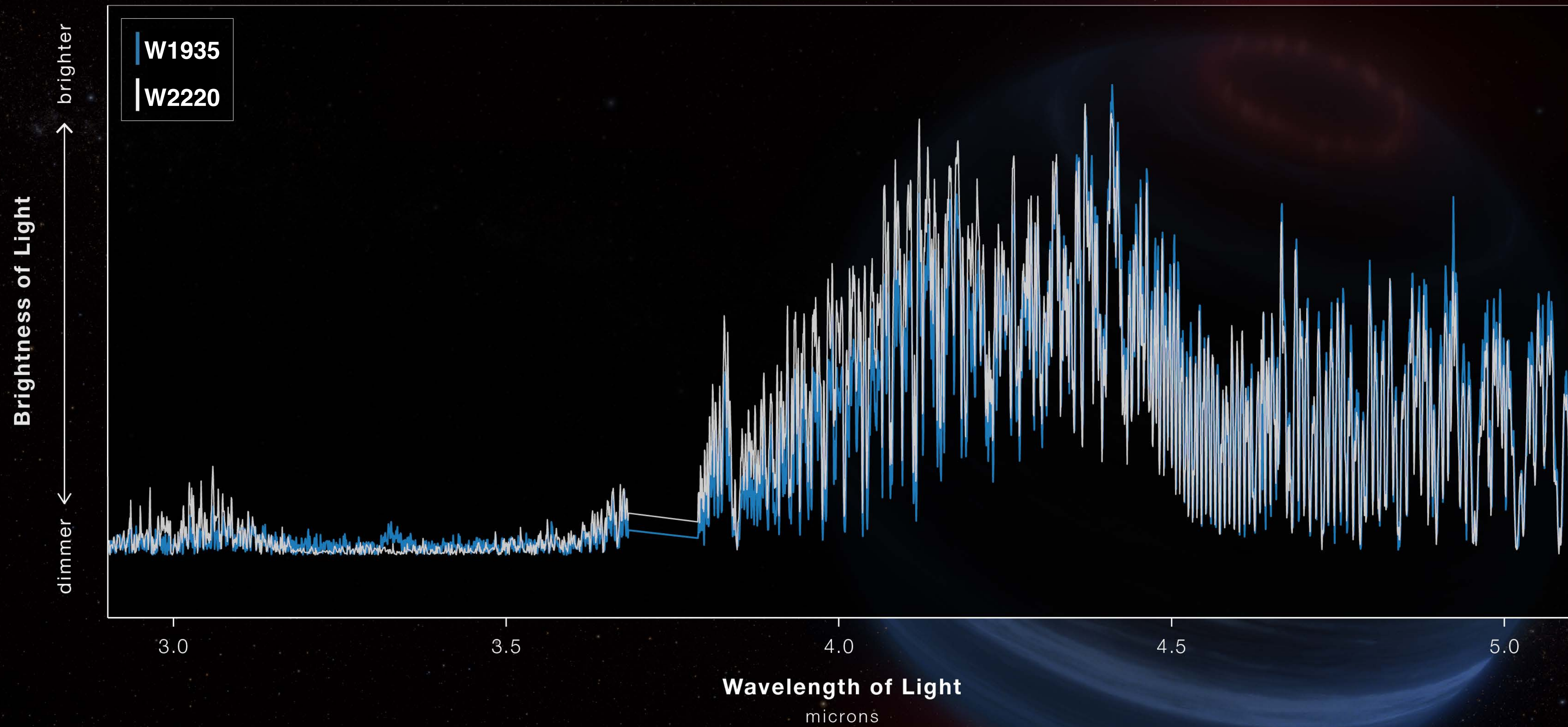
Discovered by
NASA's WISE
team

Distance: 10.47 +/- 0.23 pc



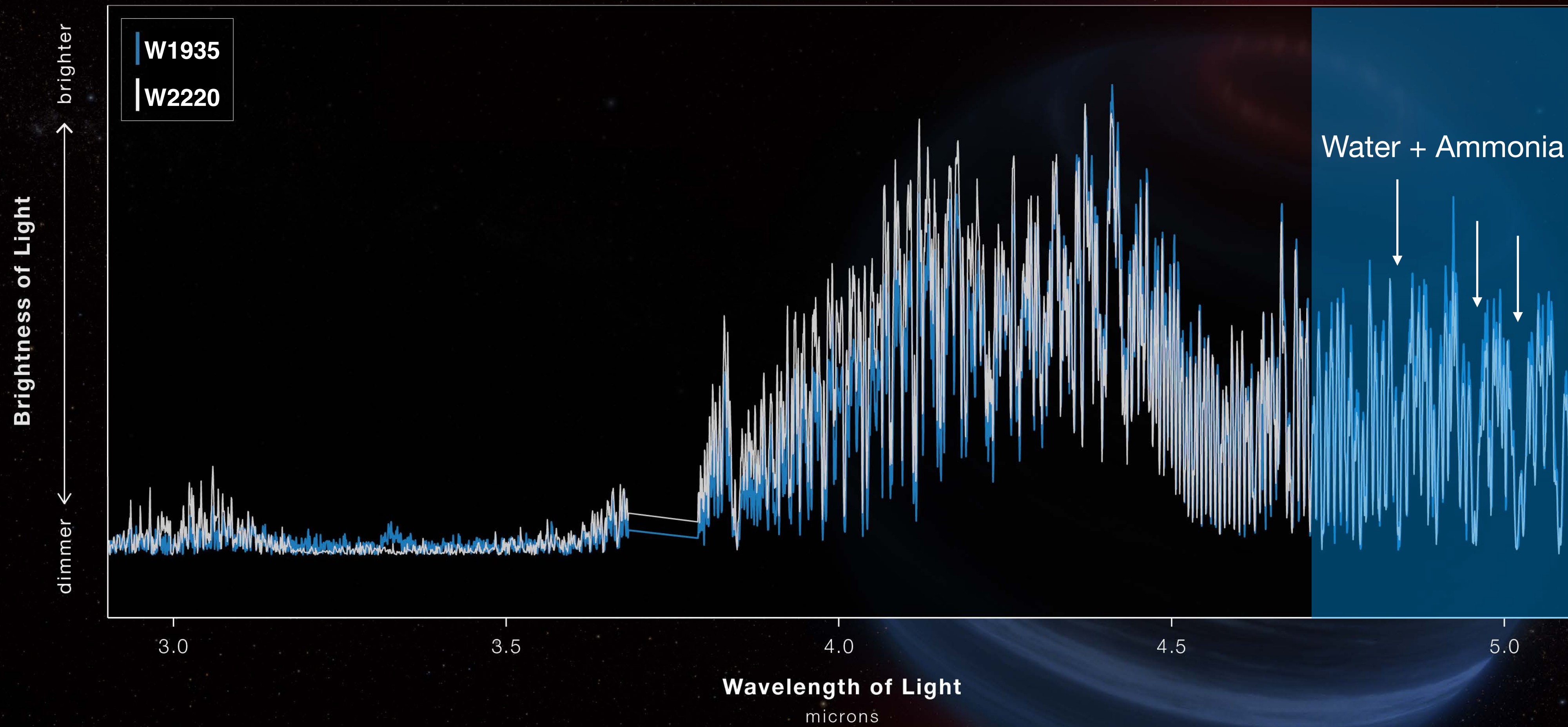
BROWN DWARFS W1935 AND W2220

NIRSpec | Slit Spectroscopy



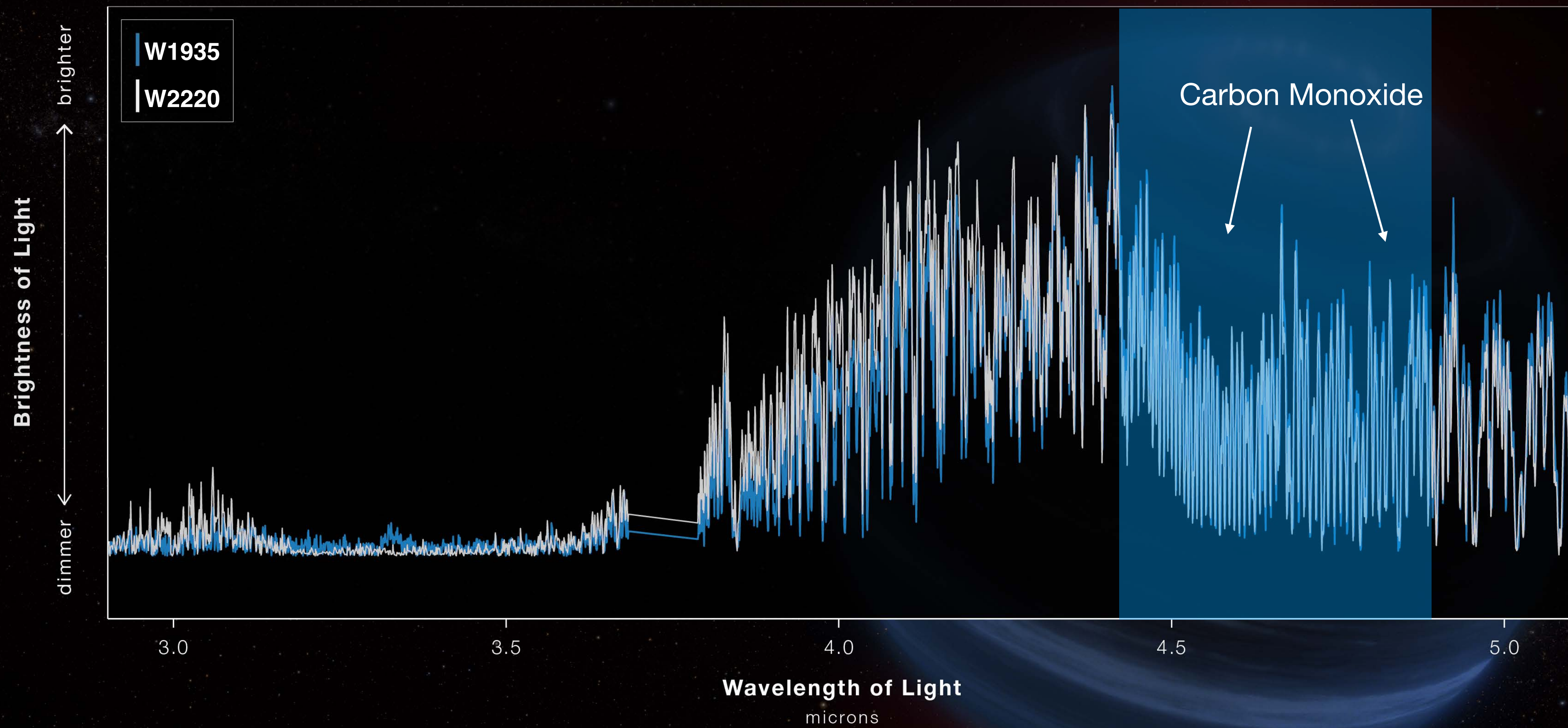
BROWN DWARFS W1935 AND W2220

NIRSpec | Slit Spectroscopy



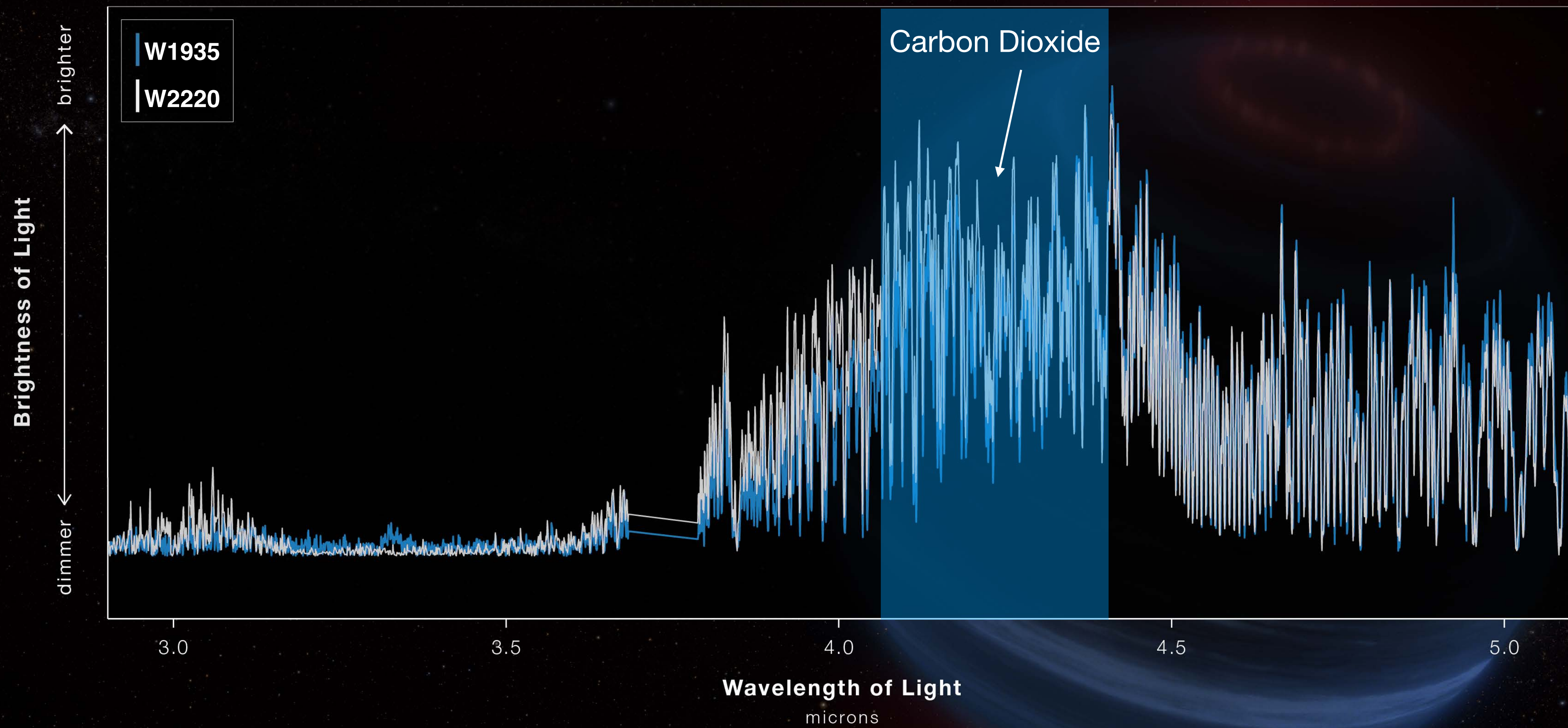
BROWN DWARFS W1935 AND W2220

NIRSpec | Slit Spectroscopy



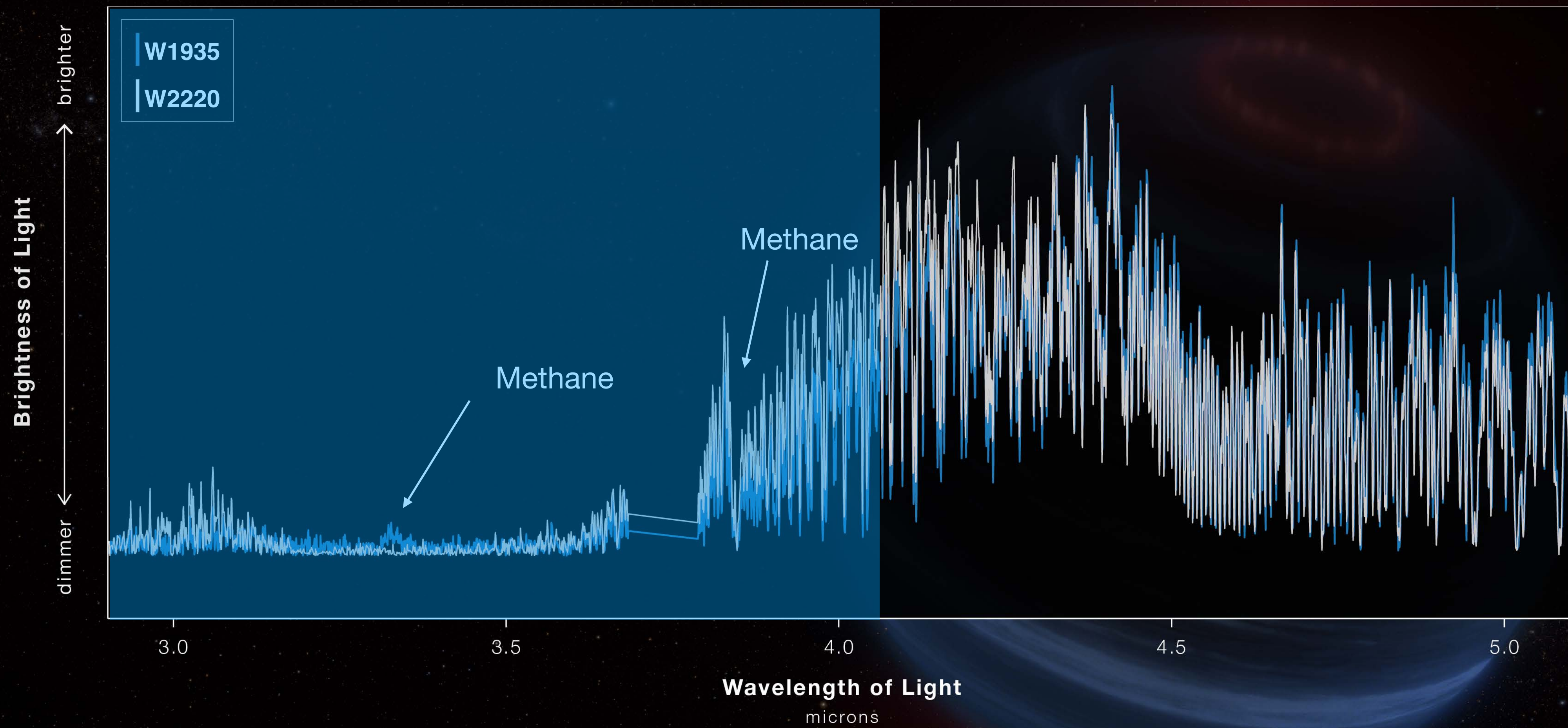
BROWN DWARFS W1935 AND W2220

NIRSpec | Slit Spectroscopy

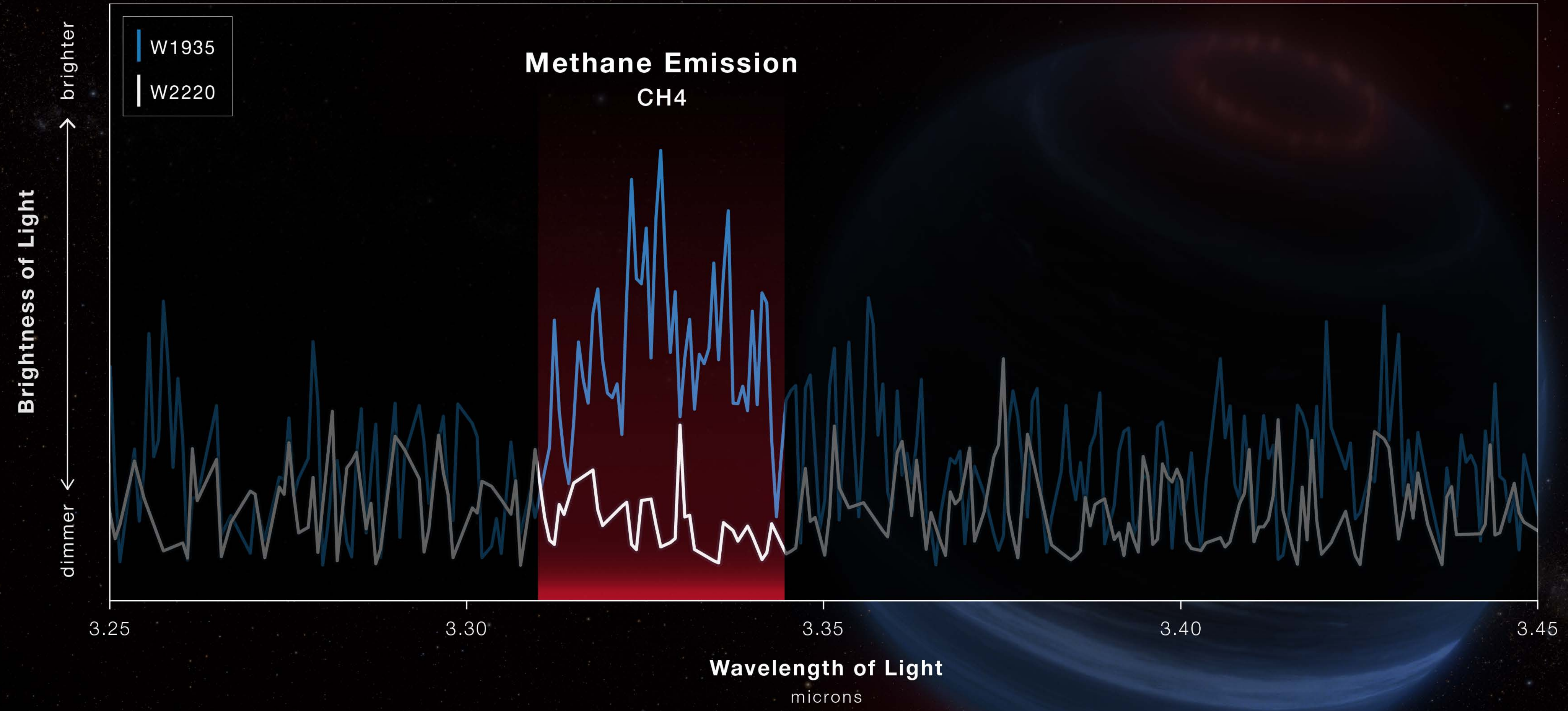


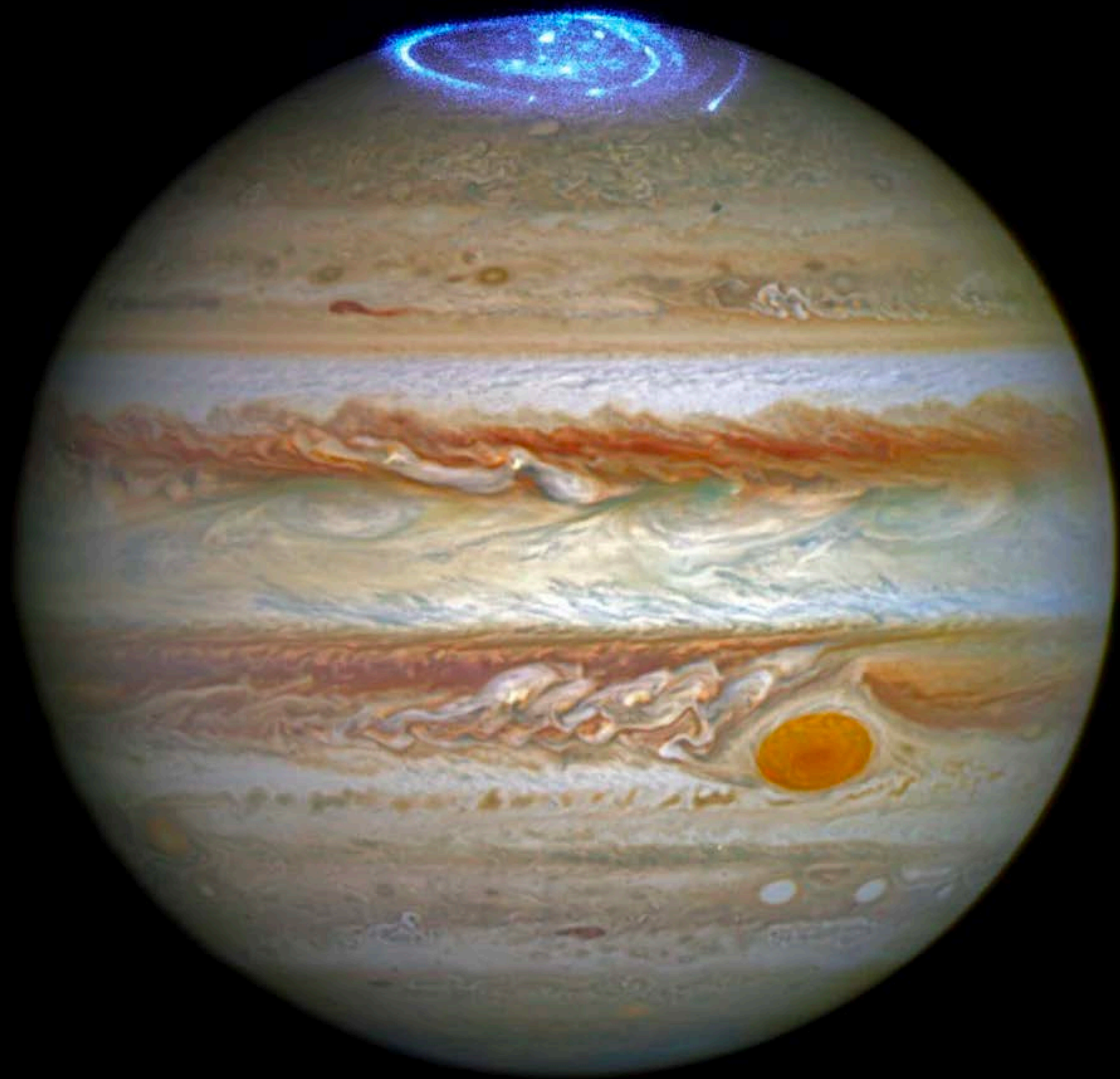
BROWN DWARFS W1935 AND W2220

NIRSpec | Slit Spectroscopy



ATMOSPHERIC METHANE





JWST Indicates Auroral Signature in a Cold Brown Dwarf

Summary

- W2220 and W1935 show rich chemistry in JWST Spectra and are near clones
- W1935 showed methane in emission which we have never seen before in a cold compact object formed outside the solar system
- We speculate auroral processes cause the feature but without a star to contribute we speculate an active moon or other process may contribute



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This result is in press with the journal Nature