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Zhang, Y.; Snellen, I.A.G.; Mollière, P.

Bulletin of the AAS • Vol. 54, Issue 5

Isotopologue ratios in exoplanet atmospheres: potential tracers of planet formation

Yapeng Zhang[1] Ignas Snellen[1] Paul Mollière[2]

[1]Leiden Observatory, [2]Max Planck Institute of Astronomy

Published on: Jun 20, 2022

URL: https://baas.aas.org/pub/2022n5i208p04

Isotope abundance ratios play an important role in astronomy and planetary sciences, providing insights in the origin and evolution of the Solar System. As we firmly step into the era of exoplanet characterization, detecting isotopologues in their atmospheres becomes feasible, suggesting great potentials of tracing the formation history of planets. In this talk, I will present the first detection of ^{13}CO isotopologue in atmospheres of two young substellar objects, the super-Jupiter YSES-1b and the brown dwarf 2M0355 with medium/high-resolution spectroscopy. The distinct CO isotopologue ratios measured in the atmosphere of the super-Jupiter (^{12}CO/^{13}CO $\sim$ 30) and the brown dwarf (^{12}CO/^{13}CO $\sim$ 100) may hint to their different formation pathways. I will also discuss future prospects of isotopologues in exoplanets, such as measuring isotope ratios of other elements (e.g. oxygen and hydrogen), and benchmarking ratios in planets against stars and brown dwarfs to further exploit the potentials of constraining planet formation.