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WASP-128b: a short-period brown dwarf transiting a G0V host

Transiting brown dwarf (BD) companions to main-sequence stars are benchmark objects for characterising substellar objects. BDs on orbits $\sim < 0.3$ AU are known to be rare around FGK stars, termed the brown dwarf desert. Only about a handful of BDs have been found from wide-field exoplanet transit surveys, despite the surveys being uniformly sensitive to companions throughout the BD desert. In this context, we report the discovery of WASP-128b: a BD transiting a Sun-like star on a 2.2 day orbit, being amongst the first BDs transiting a G dwarf. Following the detection of a periodic signal in WASP data, we obtained spectroscopy from CORALIE and HARPS and follow-up transit light curves from the TRAPPIST and Euler telescopes. A combined analysis of the data reveals a mass, radius, and density of 37.5 ± 0.8 M_{Jup}, 0.93 ± 0.02 R_{Jup}, and 57 ± 3 g cm⁻³ for WASP-128b, placing it in one of the driest parts of the BD desert. Its position in the mass-radius diagram further hints towards two distinct populations -- high- and low-mass BDs. Moreover, evolutionary models may show tentative disagreement for the radius, which may hint at inflation for WASP-128b.