



Exploring the Nu2 Lupi system with CHEOPS

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Results under embargo. Paper accepted for publication at Nature Astronomy, to be published in June.

Multi-transiting planetary systems around bright stars offer unique windows to comparative exoplanetology. Nu2 Lupi (HD 136352) is a naked-eye ($V=5.8$) Sun-like star that was discovered to host three low-mass planets with orbital periods of 11.6, 27.6, and 107.6 days via radial velocity monitoring with the HARPS spectrograph. The two inner planets (b and c) were recently found to transit by the TESS mission, prompting us to follow up the system with ESA's brand-new CHAracterizing ExOPlanets Satellite (CHEOPS). This led to the exciting discovery that the outer planet d is also transiting. With its bright Sun-like star, long period, and mild irradiation ($\square 5.7$ times the irradiation of Earth), Nu2 Lupi d unlocks a completely new region in the parameter space of exoplanets amenable to detailed characterization. By combining all available space and ground-based data, we measured its radius and mass to be $2.56\pm 0.09 R_{\text{Earth}}$ and $8.82\pm 0.94 M_{\text{Earth}}$, respectively, and refined the properties of all three planets: planet b likely has a rocky mostly dry composition, while planets c and d seem to have retained small hydrogen-helium envelopes and a possibly large water fraction. This diversity of planetary compositions makes the Nu2 Lupi system an excellent laboratory for testing formation and evolution models of low-mass planets.

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