Discovery of the Eclipsing Detached Double White Dwarf Binary NLTT 11748

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We report the discovery of the first eclipsing detached double white dwarf (WD) binary, NLTT 11748. In a photometric search for pulsations from this low-mass helium core WD, we discovered approx 180 s 3%–6% dips in the photometry. Subsequent radial velocity measurements found variations with a semi-amplitude $K_1 = 271 \pm 3\,\mathrm{km/s}$ (also now reported by Kawka et al.) and confirmed the dips as eclipses caused by an orbiting WD with a mass $M_2 = 0.648$–$0.771\,M_\odot$ for $M_1 = 0.1$–$0.2\,M_\odot$. We detect both the primary and secondary eclipses during the $P_{\mathrm{orb}} = 5.64\,\mathrm{hr}$ orbit and measure the secondary's brightness to be 3.5% $\pm$ 0.3% of the primary at SDSS-g'. Assuming that the secondary follows the mass-radius relation of a cold C/O WD and including the effects of microlensing in the binary, the primary eclipse yields a primary radius of $R_1 = 0.043$–$0.039\,R_\odot$ for $M_1 = 0.1$–$0.2\,M_\odot$, consistent with the theoretically expected values for a helium core WD with a thick, stably burning hydrogen envelope. I will discuss how our future observational efforts, such as detection of the secondary semi-amplitude K_2, multiband high-cadance photometic eclipse observations, and cross system time-delay measurements, will determine M_1, yielding accurate WD mass-radius measurement of both components, as well as a clearer indication of the binary's fate once contact is reached.