

DOPPLER BOOSTING IN THE KEPLER LIGHT CURVES OF KPD 1946+4340 AND KOI-74

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We analyzed the spectacular Kepler light curves of KPD 1946+4340, a binary that consists of a subdwarf B star and a white dwarf, and KOI-74, a binary with an A-star primary and a white dwarf secondary. Both systems are eclipsing and show ellipsoidal modulation. The ellipsoidal maxima at orbital phase 0.75 (before the companion eclipses the white dwarf) are found to be higher than the maxima at phase 0.25 (after the eclipse). The observed differences in the flux levels at the two ellipsoidal modulation maxima can be interpreted as the result of Doppler beaming. We model the binary signatures in the light curves, accounting for eclipses, ellipsoidal modulation, reflection, Doppler beaming and gravitational lensing when the white dwarf eclipses the companion. We fit model light curves to the Kepler data and establish the permitted ranges for the system parameters from Markov Chain Monte Carlo simulations. From the amplitude of the observed Doppler beaming we estimate the companions' radial velocity amplitudes. We present the first comparisons of photometrically determined radial velocities with spectroscopic values.