Strong Constraints to the Putative Planet Candidate around VB 10 using Doppler spectroscopy

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We present new radial velocity measurements of the ultra-cool dwarf VB 10, which was recently announced to host a giant planet detected with astrometry. The new observations were obtained using optical spectrographs(MIKE/Magellan and ESPaDOnS/CHFT) and cover a 63% of the reported period of 270 days. We apply Least-squares periodograms to identify the most significant signals and evaluate their corresponding False Alarm Probabilities. We show that this method is the proper generalization to astrometric data because (1) it mitigates the coupling of the orbital parameters with the parallax and proper motion, and (2) it permits a direct generalization to include non-linear Keplerian parameters in a combined fit to astrometry and radial velocity data. In fact, our analysis of the astrometry alone uncovers the reported 270 d period and an even stronger signal at 50 days. We estimate the uncertainties in the parameters using a Markov Chain Monte Carlo approach. The nominal precision of the new Doppler measurements is about 150 s^{-1} while their standard deviation is 250 ms^{-1}. However, the best fit solutions still have RMS of 200 ms^{-1} indicating that the excess in variability is due to uncontrolled systematic errors rather than the candidate companions detected in the astrometry. Although the new data alone cannot rule-out the presence of a candidate, when combined with published radial velocity measurements, the False Alarm Probabilities of the best solutions grow to unacceptable levels strongly suggesting that the observed astrometric wobble is not due to an unseen companion.

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