RevMexAA (Serie de Conferencias), **20**, 250–250 (2004)

IAU Colloquium 194 - Compact Binaries in the Galaxy and Beyond (© Copyright 2004: IA, UNAM)
Editors: G. Tovmassian & E. Sion

DETERMINING THE MASSES AND EVOLUTION OF CVs THROUGH ELLIPSOIDAL VARIATIONS

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We use simultaneous multi-wavelength *BVRIJHK* photometric observations of cataclysmic variables (CVs) to determine the inclination angles of the systems, together with phase-resolved spectroscopy to calculate the K_2 and $v\sin i$. We then calculate the masses of the system components. We are using these data to construct mass-radius diagrams of the secondaries in an effort to resolve some of the debate over their evolutionary history.

Our understanding of CV evolution is being called into question (for example see Harrison et. al. 2004, this proceedings). Howell et. al (2001, hereafter HNR) provide predictions for a mass-radius relationship of secondaries based on currently accepted evolutionary theory. The M-R diagram for secondaries should show them to be larger for their radii than main-sequence stars. By experimentally determining the masses of a set of secondaries, we can create such a mass-radius diagram and test the favored paradigm. We require the inclination angle i, $v\sin i$ and semi-amplitude of the radial velocity curve K_2 to obtain these masses. We use phase-resolved *BVRIJHK* observations of CVs to construct light curves from which we extract inclination angles using Wilson-Devinney '98. Phase-resolved spectroscopy using the sodium doublet at 8190Å allows us to construct radial velocity curves from which we can obtain the K_2 and $v\sin i$.

The infrared photometry presented here was all obtained with KPNO's 2.1 m with SQIID over the summer, the spectroscopy from APO 3.5 m with DIS in September. *JHK* bands are used to resolve the ellipsoidal variations because the secondary star is the dominant contributor of flux in the infrared; the sodium doublet at 8190Å is used for the same reasons. We here present a light curve and best-fit model for AM Her, and a radial velocity curve for IP Peg, as examples of our current work. AM Her was found to have an inclination angle of 59 ±3 degrees. We require further data for IP Peg in the 0.4 to 0.7 orbital phase range to properly constrain the model shown here, but the preliminary results are in good accord with the published value of 288 km/sec.

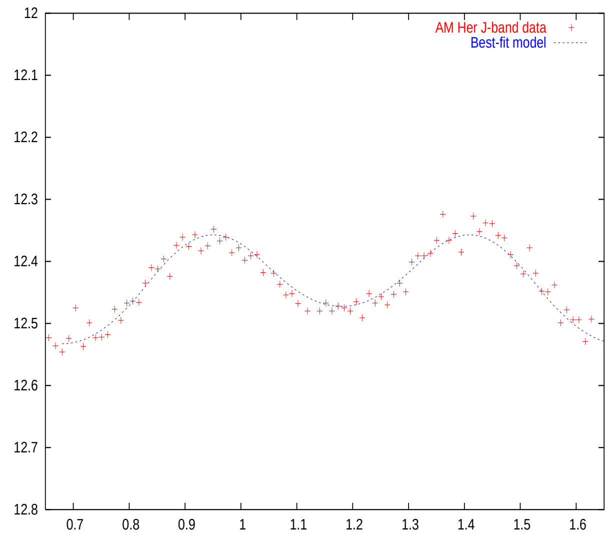

Fig. 1. *J*-band data for AM Her (unconnected points), together with the best-fit model (line).

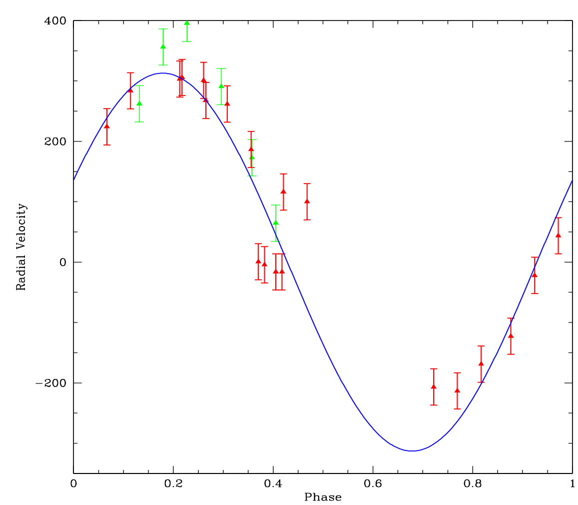

Fig. 2. Radial velocity curve for IP Peg (triangles), together with the best-fit sine wave (line).

REFERENCES

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