

# $\gamma^2$ Velorum: Orbital Solution and Fundamental Parameter Determination with SUSI

J. R. North, P. G. Tuthill, W. J. Tango & J. Davis

School of Physics, University of Sydney, NSW 2006, Australia

The first complete orbital solution for the double-lined spectroscopic binary system  $\gamma^2$ -Velorum, obtained from measurements with the Sydney University Stellar Interferometer (SUSI), is presented. This system contains the closest example of a Wolf-Rayet star and the promise of full characterisation of the basic properties of this exotic high-mass system has subjected it to intense study as an archetype for its class. In combination with the latest radial-velocity results, our orbital solution produces a distance of  $336^{+8}_{-7}$  pc, significantly more distant than the (Hipparcos) estimation (Schaerer et al. 1997; van der Hucht 1997). The ability to fully specify the orbital parameters has enabled us to significantly reduce uncertainties and our result is consistent with the VLTI observational point (Millour et al. 2006), but not with their derived distance. Our new distance, which is an order of magnitude more precise than prior work, demands critical reassessment of all distance-dependent fundamental parameters of this important system. In particular, membership of the Vela OB2 association has been reestablished, and the age and distance are also in good accord with the population of young stars reported by Pozzo et al. (2000). We determine the O-star primary component parameters to be  $M_V(O) = -5.63 \pm 0.10$ , mag,  $R(O) = 17 \pm 2$ ,  $R_{\odot}$  and  $\text{cal } M(O) = 28.5 \pm 1.1$ ,  $M_{\odot}$ . These values are consistent with calibrations found in the literature if a luminosity class of II-III is adopted. The parameters of the Wolf-Rayet component are  $M_V(WR) = -4.33 \pm 0.17$ , mag and  $\text{cal } M(WR) = 9.0 \pm 0.6$ ,  $M_{\odot}$ .

Reference: MNRAS, 2007, vol 377, pages 415-424

Status: Manuscript has been accepted

Weblink:

Comments:

Email: j.north@physics.usyd.edu.au