Direct constraint on the distance of y2 Velorum from AMBER/VLTI observations

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In this work, we present the first AMBER observations, of the Wolf-Rayet and O (WR+O) star binary system y2 Velorum. The AMBER instrument was used with the telescopes UT2, UT3, and UT4 on baselines ranging from 46m to 85m. It delivered spectrally dispersed visibilities, as well as differential and closure phases, with a resolution R = 1500 in the spectral band 1.95-2.17 micron. We interpret these data in the context of a binary system with unresolved components, neglecting in a first approximation the wind-wind collision zone flux contribution. We show that the AMBER observables result primarily from the contribution of the individual components of the WR+O binary system. We discuss several interpretations of the residuals, and speculate on the detection of an additional continuum component, originating from the free-free emission associated with the wind-wind collision zone (WWCZ), and contributing at most to the observed K-band flux at the 5% level. The expected absolute separation and position angle at the time of observations were 5.1+-0.9mas and 66+-15Â° respectively. However, we infer a separation of 3.62+0.11-0.30 mas and a position angle of 73+9-11 degrees. Our analysis thus implies that the binary system lies at a distance of 368+38-13 pc, in agreement with recent spectrophotometric estimates, but significantly larger than the Hipparcos value of 258+41-31 pc.

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