*The Lives and Death-Throes of Massive Stars*
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# The outer disk of the classical Be star $\psi$ Per

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**Abstract.** To this date $\psi$ Per is the only classical Be star that was angularly resolved in radio (by the VLA at $\lambda = 2\,$cm). Gaussian fit to the azimuthally averaged visibility data indicates a disk size (FWHM) of $\sim 500$ stellar radii (Dougherty & Taylor 1992). Recently, we obtained new multi-band cm flux density measurements of $\psi$ Per from the enhanced VLA. We modeled the observed spectral energy distribution (SED) covering the interval from ultraviolet to radio using the Monte Carlo radiative transfer code `HDUST` (Carciofi & Bjorkman 2006). An SED turndown, that occurs between far-IR and radio wavelengths, is explained by a truncated viscous decretion disk (VDD), although the shallow slope of the radio SED suggests that the disk is not simply cut off, as is assumed in our model. The best-fit size of a truncated disk derived from the modeling of the radio SED is $100^{+5}_{-15}$ stellar radii, which is in striking contrast with the result of Dougherty & Taylor (1992). The reasons for this discrepancy are under investigation.

**Keywords.** stars: individual ($\psi$ Per), stars: emission-line, Be, radio continuum: stars

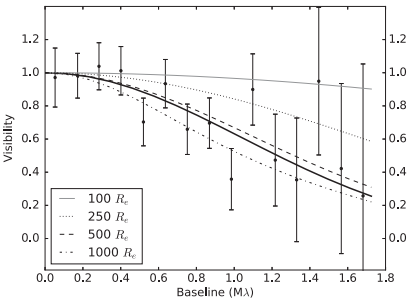


**Figure 1.** Azimuthally averaged visibility data of Dougherty & Taylor (points) and a Gaussian fit to them (thick line) overplotted with the visibility curves derived from our azimuthally averaged models with different disk sizes (in stellar equatorial radii $R_e$). The disk size best reproducing the radio SED is $100\,R_e$, which does not agree well with the interferometric data.

## References

Carciofi, A.C. & Bjorkman, J.E. 2006, *ApJ*, 639, 1081
Dougherty, S.M. & Taylor A.R. 1992, *Nature*, 359, 808