The life cycles of Be viscous decretion discs: fundamental disc parameters of 54 SMC Be stars

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Abstract

Be stars are fast-rotating, main-sequence massive stars with emission features in their spectrum whose origin lies in a circumstellar gaseous disc. Several Be stars undergo phases of disk formation and dissipation, which shows up as bumps or dips in their lightcurves, depending on their inclination angle. Modeling these bumps allow us to estimate the disk parameters for each event, namely the magnitude of the viscosity (alpha) and the amount of mass and angular momentum lost by the star through the disk. We present the results for a sample of 54 Be stars from the OGLE survey of the SMC. The values of alpha found are typically of a few tenths, consistent with recent results in the literature, but larger than the current theory predicts. The typical mass and angular momentum loss rates associated with the disk events are of the order of 1E-10 Msun/year and 5E-36 cmˆ2/sˆ2, respectively. The angular momentum loss rate was found to be at least one order of magnitude below the values predicted by state-of-the-art evolutionary models. Our results put constraints, for the first time, on the internal mechanisms of angular momentum transport of massive fast rotating stars.

Keywords: circumstellar matter, radiative transfer, stars: emission, line, Be, stars: mass, loss, techniques: photometric, hydrodynamics

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