Disk-Loss and Disk-Renewal Phases in Classical Be Stars II. Contrasting with Stable and Variable Disks

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Recent observational and theoretical studies of classical Be stars have established the utility of polarization color diagrams (PCD) in helping to constrain the time-dependent mass decretion rates of these systems. We expand on our pilot observational study of this phenomenon, and report the detailed analysis of a long-term (1989-2004) spectropolarimetric survey of 9 additional classical Be stars, including systems exhibiting evidence of partial disk-loss/disk-growth episodes as well as systems exhibiting long-term stable disks. After carefully characterizing and removing the interstellar polarization along the line of sight to each of these targets, we analyze their intrinsic polarization behavior. We find that many steady-state Be disks pause at the top of the PCD, as predicted by theory. We also observe sharp declines in the Balmer jump polarization for later spectral type, near edge-on steady-state disks, again as recently predicted by theory, likely caused when the base density of the disk is very high, and the outer region of the edge-on disk starts to self absorb a significant number of Balmer jump photons. The intrinsic V-band polarization and polarization position angle of gamma Cas exhibits variations that seem to phase with the orbital period of a known one-armed density structure in this disk, similar to the theoretical predictions of Halonen & Jones. We also observe stochastic jumps in the intrinsic polarization across the Balmer jump of several known Be+sdO systems, and speculate that the thermal inflation of part of the outer region of these disks could be responsible for producing this observational phenomenon. Finally, we estimate the base densities of this sample of stars to be between ~8x10^{-11} to ~4 times 10^{-12} g cm^{-3} during quasi steady state periods given there maximum observed polarization.

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