Dynamics and Variability in Six Galactic Open Clusters

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We analyze six intermediate- and old-age Galactic open clusters using Gaia DR3. Cluster members were identified with Gaussian Mixture Models, well suited for low-mass stars. Distances (1.76–4.20 kpc) and ages (0.2–2 Gyr) confirm their intermediate-age nature. King model fits reveal compact morphologies with core radii of 1–10′ and cluster radii of 5–24′. We detect 13 BSS and 3 YSS, concentrated toward cluster centers, implying mass transfer or stellar collisions. The mass function slopes (0.96–1.19) are flatter than Salpeter, indicating mass segregation. Orbital integrations show nearly circular, disk-confined paths, consistent with thin-disk origins and tidal stripping of low-mass stars. Twelve variables were identified from TESS, including γ Doradus, SPB stars, eclipsing binaries, and a YSS candidate. Two binaries modeled with PHOEBE yield mass ratios of 1.37 and 2.16. Our results highlight how combining orbital dynamics and variable star studies advances understanding of open cluster evolution.