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Diagnosis of substructures around the rare double cluster h and χ Persei

We present the discovery and characterization of debris stellar groups around the Double Cluster h (NGC 869) and chi (NGC 884) Persei to diagnose the formation and dynamical evolution of binary star clusters. Stars are formed in groups, and those surviving the emergence out of the molecular clouds become a star cluster. Open star clusters, primarily located in the Galactic disk, are particularly vulnerable to continuous disintegration: (1) Two-body relaxation among member stars leads to ejection of low-massive members, ever shallowing the gravitational potential, (2) External tidal disturbances exacerbate the situation, manifest by tidal tails or debris stellar groups sharing the same volume and motion with the parental cluster. Then-members of dissolved clusters constitute the Galactic field stars. While the majority of stars have companions, and pair galaxies are common, double star clusters are relatively rare. Using the astrometry and photometry from the latest space mission Gaia (Data Release 3), we identified more than a handful of distinct groups, some found for the first time, with distance and space motion consistent with those of the Double Cluster. We derived for each group its size, age, and number of members. We offer convincing evidence of some groups being ejected as the cluster pair orbits each other.

Section

Stars/Star Clusters

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