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On the determination of stellar mass and binary fraction of open clusters within 500 pc (poster pitch)

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We investigated the stellar mass function and the binary fraction of 114 nearby (within 500pc) open clusters (OCs) using the high-precision photometric data from Gaia DR3. We estimate the mass of member stars by using ridge lines (RL) that are better in line with the observed CMD, thus obtaining more reasonable stellar mass and the binary mass ratio at the low mass region. By analyzing the present-day mass function (PDMF) of star clusters, we found that most of them follow a two-stage power law distribution. Adopting the visual inspection, we determined the segmentation point of a high and low mass segment for each cluster and fitted the gamma values of different mass segments separately. For our cluster sample, the median values of Gamma_H and Gamma_1 are 1.37 and 0.28, respectively, which are roughly consistent with the IMF results provided by Kroupa (2001). In order to quantify the mass segregation effect of different star clusters, we calculated the cumulative radial distribution function of stars with different masses and used their area difference A+ to characterize the mass segregation degree of OCs. It is shown that there is a significant correlation between A+ and the dynamical evolution stage of OCs: the longer the dynamical evolution, the more obvious the mass segregation effect. We also estimate the binary fraction of OCs ($q \geq 0.5$), varying from 6% to 34% with a median of 17%. Finally, we provided a catalog of 114 nearby cluster properties, including the total mass, the binary fraction, the PDMF, and the dynamical state.

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