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Orbital Scattering of Protoplanets Around low-Mass Stars in Stellar Clusters

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A large proportion of stars are formed in star clusters which will disperse as a result of the strong mass loss process driven by massive stars. During the period of planet formation, the star clusters should still be quite compact and close encounters at low relative speed ($\sim$ 3-5 km s-1) within a distance of a few hundred AU could still be frequent enough that some protoplanets in outer regions surrounding their host stars could be subject to strong orbital perturbation changing their near-circular orbits to highly elliptical ones, or even being ejected into interstellar space. In this work, we will report on the statistical results of probable destruction and transformation of first-generation planetary systems of low-eccentricity and low-inclination in M- and K-type stars to planetary systems in chaotic orbits via gravitational interaction with passing stars. Such scenario might have interesting implications on the dynamical origin and evolution of exoplanets around low-mass stars.