Candidates to Hypervelocity Stars in the S-PLUS Survey

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Abstract

HyperVelocity Stars (HVS) are stars that exceed the Galaxy's escape velocity. The most likely mechanism to explain the speed of these stars is the interaction of binary stars with the supermassive black hole located in the center of the Galaxy. Recently the search and characterization of these stars has increasing considerably with largest astronomical surveys such as SDSS, LAMOST, RAVE and mainly with second data release (DR2) of the mission Gaia, wich provides five astrometric parameters for ~ 1.7 billion stars and full astrometric parameters for ~ 7 million stars. In this respect, as a contribution to photometric characterization of this population, we report 6 candidates to HVS in the first S-PLUS data release using the recent Gaia Early Data Release 3. Of these, with a probability larger than 40% of being unbound to the galaxy, 2 have low relative error in parallax ($f \equiv \sigma_\varpi / \varpi < 0.2$) and, with a probability larger than 75% of being unbound to the galaxy, 4 have high relative error in parallax ($f \geq 0.2$) and therefore this sample needs to be taken carefully as candidates for HVS. Both samples were obtained comparing the spatial velocity in galactocentric coordinates and the escape velocity calculated from a gravitational potential for the Galaxy (MWPotencial 2014) implemented in *Galpy*.