

Revealing the progenitors of Galactic Supernovae

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The majority of massive stars are born in binaries, and most unbind upon the first supernova. With the precise proper motion measurements of Gaia, it is possible to trace back the trajectory of stars in the vicinity of young supernova remnants and neutron stars to search for intersecting paths, and hence ejected companions. At present, only a handful of supernova runaway candidates are known, but a large sample would enable direct, statistically significant insight into the binary progenitors of supernovae. We present binary population synthesis predictions for secondary stars ejected by the supernova of their companion, and evaluate the prospects for finding more with Gaia. We demonstrate that the current sample of stars ejected by the supernova of their companion can be increased by a factor of a few with Gaia data release 3, and show that further progress (by an order of magnitude or more) is possible with future Gaia data releases and the deep, NIR imaging capability of JWST, Euclid and more.

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