PUBLISHED: 10 JULY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0191

research highlights

ASTROMETRY

Rise of the machines

Mon. Not. R. Astron. Soc. **470,** 1388–1403 (2017)

As if searching for a needle in a haystack isn't difficult enough, imagine that the needle is moving. In the search for hypervelocity stars in the Milky Way, Tommaso Marchetti and co-workers used a machine-learning algorithm to sift through roughly 2 million stars in the Tycho–Gaia Astrometric Solution catalogue (a subset of the first data release of Gaia) for which positions, proper motions and parallax are known. They found a handful of such stars.

Hypervelocity stars are rare; we know of roughly 20 in the Milky Way. Originating in the Galactic Centre, their radial speeds can reach Galactic escape velocity. More samples would help us understand Galactic Centre stellar populations and their evolution, but we need a systematic approach.

Marchetti *et al.* chose an artificial neural network, which they first trained using a mock data set. Within an hour of the data release, they managed to exclude 99% of the stars. Further selection criteria reduced the candidate pool to 80 stars, and then crosschecks with other surveys and fresh observations brought the number to 14 stars with velocities in excess of 400 km s^{-1} in the Galactic rest frame. Once the authors traced back their orbits, they found one possibly unbound star travelling at 520 km s^{-1} and five runaway stars at 400–780 km s^{-1}. Bring on the data.

May Chiao