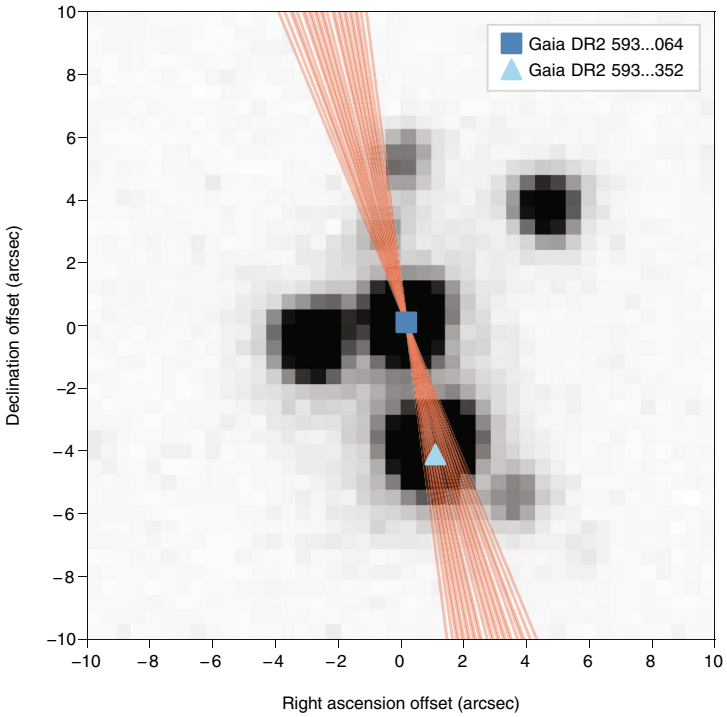
STARS

Quirks of Gaia

Mon. Not. R. Astron. Soc. (in the press); preprint available at https://arxiv.org/abs/1901.10460



Credit: Wiley

The astrometric data provided by the European Space Agency's Gaia satellite has already revolutionized stellar and Galactic astronomy in the short time it has been available. A particularly interesting development has been the identification of stars that seem to be moving extremely rapidly with respect to their neighbours — 'hypervelocity stars'. Douglas Boubert and colleagues have followed up on one hypervelocity star in order to confirm its radial velocity (RV). Boubert et al. find that the star in question is actually moving more than ten times slower than expected from the Gaia data, uncovering an observational effect that may have a significant impact on other hypervelocity stars identified by Gaia.

Based on seven observations, Gaia DR2 5932173855446728064 has a median RV of -614.3 ± 2.5 km s^{-1}, making it unbound from the Galaxy. However, according to eight epochs of optical spectra from the Southern Astrophysical Research Telescope, this star's mean RV is just -56.5 ± 5.3 km s^{-1}. What gives? To find out, Boubert et al. followed a clue in the Gaia metadata: the star was flagged as a duplicate source. Examining the immediate environs revealed that the star is surrounded by several others, and digging deeper into the observational details, it seemed very likely that the seven scans had taken place over just four days, and were all in the same direction (see image, with the scans in red). This meant that a brighter star (light-blue triangle) was always observed before the putative hypervelocity star (blue square), leading to an erroneous RV measurement due to the blending of the light from the two stars in Gaia's Radial Velocity Spectrometer.

This data pipeline issue likely affects 112 of the 202 hypervelocity stars identified to date — those that have bright stars within 6.4".

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Published online: 27 February 2019
https://doi.org/10.1038/s41550-019-0735-x