ABSTRACT
We report the discovery of 28 candidate high-velocity stars (HVSs) at heliocentric distances of less than 3 kpc, based on LAMOST DR1. Our sample of HVS candidates covers a much broader color range than the equivalent ranges discussed in previous studies and comprises the first and largest sample of HVSs in the immediate solar neighborhood, at heliocentric distances less than 1–3 kpc. The observed as well as the derived parameters for all candidates are sufficiently accurate to allow us to ascertain their nature as genuine HVSs, of which a subset of 12 objects represents the most promising candidates. Our results also highlight the great potential of discovering statistically large numbers of HVSs of different spectral types in LAMOST survey data. This will ultimately enable us to achieve a better understanding of the nature of Galactic HVSs and their ejection mechanisms, and to constrain the structure of the Galaxy.

Our work: based on LAMOST DR1

- HVS candidate selection
  - LAMOST DR1, [1723685];
  - with SDSS_photometry & UCAC4_PM [6148];
  - with sufficient S/N: [2600];
  - SDSS_color filtering (photometric metallicity): [1800];
  - photometric distance, preliminary Vgt>300km/s filtering: [−200];
  - visual inspection on spectrum, giants excluding: [28] HVS candidates

Hyper velocity stars – fast enough to escape from the Galaxy

Possible origins:
- tidal disruption of binary by MBH at Galactic center (the Hills mechanism)
- disruption of binary in the disk (via SN)
- single star with binary BHs; ……

Observational evidences of HVS

- Mostly early type stars (until 2010)
- Large distance (Galacto- or Helio-centric)

New finding of HVS via LAMOST

- LAMOST Galactic Stellar Survey / DR1 –spectral for 2M stars

Summary
- Discovery of 28 HVS from LAMOST DR1
- Covers a broader color range than previous studies
- First sample of HVS candidates at solar neighborhood
- The nature (origins) of these HVS need further probing
- Great potential of discover HVS with LAMOST data

Contact: chenli@shao.ac.cn, jzhong@shao.ac.cn

References: