RevMexAA (Serie de Conferencias), **50**, 55–55 (2018)

NEAR-IR TRIGONOMETRIC PARALLAXES OF NEARBY STARS IN THE GALACTIC PLANE USING THE VVV SURVEY

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We used VVV multi-epoch K_S band observations, over a ∼5 years baseline to obtain milli and sub-milli arcsec precision astrometry for a sample of 18 previously known high proper motion sources, including precise parallaxes for the first time. Five of these systems are most likely very low mass stars (VLMS) belonging to the galactic halo based on their tangential velocities. This proves the capability of the VVV project to measure high precision trigonometric parallaxes for VLMS up to distances of ∼400 pc reaching farther than most other ground based surveys or space missions for these types of stars.

The VVV survey is a multi-epoch near infrared ESO public survey using the VISTA 4.2 m telescope, observing over 560 square degrees towards the most crowded regions of the sky: the galactic bulge and disk (Minniti et al. 2010). We selected sources from previous studies of high proper motion stars, lying within the VVV area that were not saturated on the images. Ten sources were obtained from Lépine (2005), and seven co-moving companions from Ivanov et al. (2013) and Beamín et al. (2013). For these 17 sources we selected reference stars within 1 arcmin around the target, selected among the highest S/N objects in the field, appearing in at least 80% of the frames, and not exhibiting large proper motions. Given the high stellar density in these fields, this provides an adequate number of reference stars (>100 sources).

After all epochs were on the same astrometric reference system, we fit proper motion, parallax and a shift per coordinate. More details on the procedure can be found in Smart et al. (2003) and Beamín et al. (2015). We obtained improved proper motion - and for the first time - parallaxes for these 17 sources; we also provide a revised proper motion and parallax for one additional source (Beamín et al. 2013). Our proper motion results are within 1σ errors from the values published in their respective discovery papers. We reached milli and sub-milli arcsec precision in a couple of sources, comparable with space-based observations and results from state-of-the-art ground-based measurements. Five systems are most likely subdwarfs halo members given their tangential velocities and photometric colours. Four objects within 60 pc are likely members of the galactic thick disk, based on their kinematics and photometry.

Sources L 149-77 B and L200-41 B are co-moving with a brighter star listed in the TGAS catalog, our astrometric measurements for the fainter member agrees within the 1.5σ error with the parallax calculated for the primary source by the Gaia mission. We found one source, 2MASS J17433729-2303586 that might produce a microlensing event in the upcoming years to the star 2MASS 17433715-2304095, therefore high spatial resolution imaging, spectroscopic and time series photometric follow up for this target is encouraged. A list of high proper motion sources found with VVV survey is available in Kurtev et al. (2017). Further spectroscopic characterisation of ultra cool dwarfs is in ongoing. An extended version of this contribution can be found in Beamin et al. (2017).

Acknowledgments: This study was supported by programa Comité Mixto ESO-Gobierno de Chile.

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