

PROPER MOTIONS AND BROWN DWARFS IN THE VVV SURVEY

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We use the first three years of observations of the VISTA Variables in the Vía Láctea Survey, to create a catalog of high proper motion objects, and search for nearby objects, here we describe the initial results including the discovery the first brown dwarf in the VVV survey.

The Vista Variables in the Vía Láctea (VVV), is an ESO public Survey observing ~ 560 sq. degrees towards the Galactic bulge and southern inner disk at NIR wavelengths (*ZYJH K_s*), and a multi-epoch campaign in the *K_s* band with over 80 and up to 100 epochs per pointing obtained through 7 years (Minniti et al. 2010; Saito et al. 2012). The high spatial resolution ($0.34''\text{pix}^{-1}$) and outstanding quality of the VVV images allow us to obtain proper motions and parallaxes for nearby stars and brown dwarfs towards some of the most crowded regions in the sky.

We searched for fainter companions to high proper motion objects making color composite images using the VVV and 2MASS *K_s* band images, the results of this study were published by Ivanov et al. (2013) and include seven new companions to high proper motion stars, the recovery of six previously known co-moving pairs, the re-classification of a common proper motion pair as only two stars with high proper motion, among others.

We tried to find high proper motions sources, using four epochs as evenly spaced as possible observed under similar weather conditions. We applied constraints on motions larger than 100 mas yr^{-1} and $K_s \leq 13.5$. Over two thousand of candidates arise and a complete catalog of the proper motions is going to be publicly available early next year (Kurtev et al. In preparation)

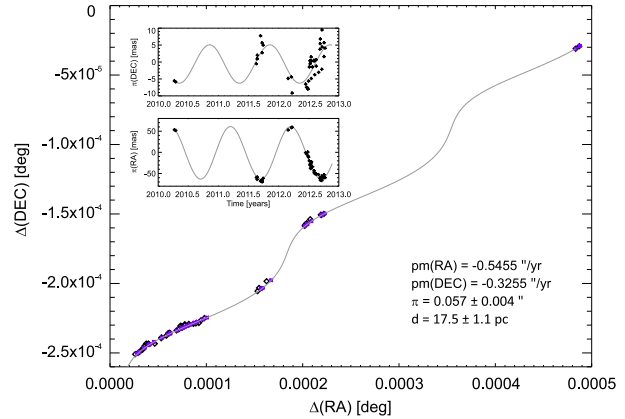


Fig. 1. Relative motion of VVV BD001 in differential equatorial coordinates, the motion reveals the proper motion and the parallax. In the inner panels we show the parallax motion for each celestial coordinate, after removing the proper motion.

In Figure 1 we show the motion of the first brown dwarf in the VVV survey area (Beamín et al. 2013), located only $\sim 4^\circ$ from the Galactic center, we determine a parallax based distance of $17.5 \pm 1.1\text{ pc}$ using the VVV data alone and estimated a spectral type of L5 and evidence of being unusually blue. We have a handful of brown dwarf candidates and we expect to find over thirty Brown dwarfs in the VVV area, for most of them we will be able to measure precise distances and NIR data sets covering seven years are going to be available for study.

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