

Nearby cool brown dwarfs (BDs) are expected to be very faint high proper motion objects. We identify them not only based on their characteristic colours in one deep survey, but as moving objects showing up in various surveys with time baselines of several years. This character had already helped us discover two very nearby ($d \sim 5$ pc), ultracool BDs, WISE J0254+0223 and WISE J1741+2553, and classify the latter spectroscopically as a T9.5 dwarf (Scholz et al. 2011, *A&A*, 532, L5). By combining the latest near-infrared (NIR) data releases of UKIDSS with mid-infrared WISE and other available NIR (2MASS) and red optical (SDSS z-band) multi-epoch data, we determined new proper motions of 14 known T5.5-Y0 dwarfs, many of which are significantly (>2 -10 times) more accurate than previous ones (Fig.1). Using UKIDSS and all other available positional measurements (17 epochs) of the T8 dwarf WISE J0254+0223 we improved its trigonometric parallax (Fig.2). We also detected three new >T5 candidates by their proper motion and colours using UKIDSS, 2MASS and SDSS and classified them spectroscopically (Fig.3) as T5.5-T6 dwarfs using LBT/LUCIFER1 (Scholz et al. 2012, *A&A*, 541, A163).

New proper motions of 14 known T5.5-Y0 dwarfs

Ten of the 14 known cool BDs identified by us in UKIDSS are recent WISE discoveries (Scholz et al. 2011, Kirkpatrick et al. 2011). We improved the proper motions for all of them except for the Y0 dwarf WISE J1541-2250, which has a doubtful UKIDSS counterpart resulting in a very different proper motion. For the remaining four objects our proper motions are in good agreement with former values (Fig.1).

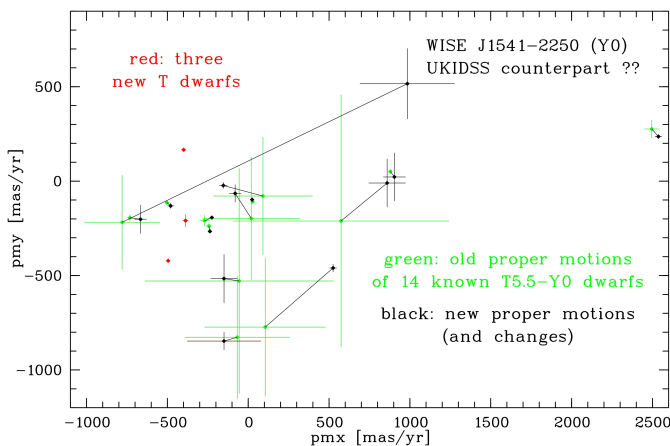


Fig.1: Comparison of 14 previously known (green) and our newly determined (black) proper motions with their error bars and black lines showing the changes. Also shown are the proper motions of our three new T5.5-T6 dwarfs (red).

Improved trigonometric parallax of WISE J0254+0223

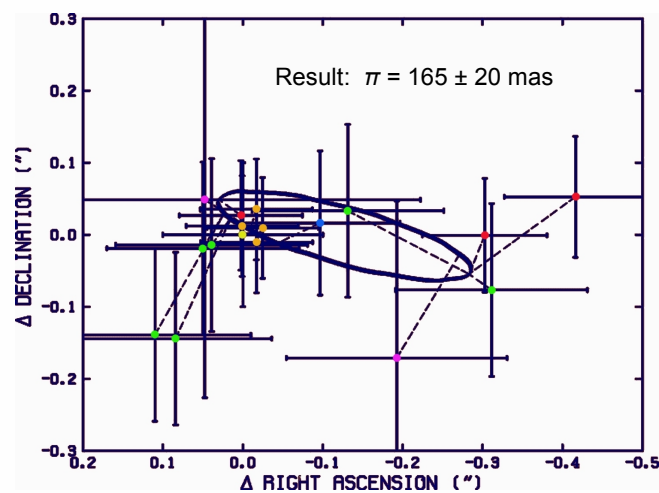


Fig.2: Parallax ellipse for WISE J0254+0223 after combined proper motion and parallax solution and subtraction of the proper motion. Coloured dots (blue – SDSS, green Pan-STARRS1, yellow – 2MASS, orange – UKIDSS, red – WISE, pink – Spitzer) with error bars show the individual positional measurements, dashed lines show their displacements relative to the fit.

Three newly discovered T5.5-T6 dwarfs

For our three new objects, ULAS J0954+0623, ULAS J1152+0359, and ULAS J1204-0150, we obtained NIR spectroscopic follow-up with LBT/LUCIFER1 and classified them as T5.5, T6, and T5.5 dwarfs (Fig.3). With their estimated spectroscopic distances of about 25-30 pc, their proper motions of about 400-600 mas/yr lead to tangential velocities of about 50-80 km/s, typical of the Galactic thin disk population. These three new objects are among the five brightest (in J) of all >T5 UKIDSS discoveries.

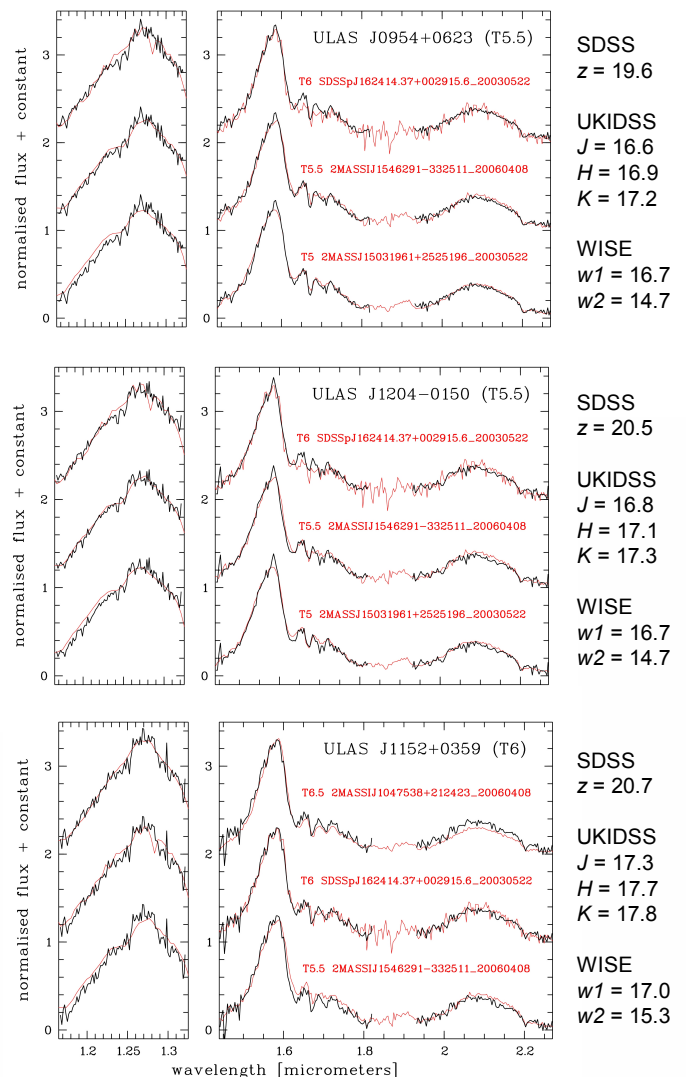


Fig.3: LUCIFER1 J - (left) and $H+K$ -band (right) spectra of ULAS J0954+0623 (top), ULAS J1204-0150 (middle), and ULAS J1152+0359 (bottom). The target spectra (black) were smoothed for the comparison with the lower-resolution ($R \sim 120$) template spectra (red) of T5/T6 (Burgasser et al. (2004) and T5.5/T6.5 (Burgasser et al. 2008) dwarfs. SDSS z , UKIDSS JHK and WISE $w1w2$ magnitudes are also shown.