## APPENDIX B: EXAMPLES OF THE ASTROMETRIC SEARCH FOR COMPANIONS OF EXOPLANET HOST STARS

The astrometric search for companions, carried out in the course of this survey, is shown here using the exoplanet host stars HD 75289, HD 170469, Corot-2, and Kepler-99, as examples. These stars exhibit proper motions $\mu$, which range from about 3.5 up to 229 mas/yr, and parallaxes $\pi$ in the range between about 4.7 and 34.3 mas, i.e. they are all typical targets of this survey. In order to assure that the used astrometric search procedure for companions can well be illustrated here, the selected exoplanet host stars are all located at low Galactic latitudes ($b \lesssim 10\,^\circ$), where a large number of sources is expected around the exoplanet host stars within the applied angular search radius $r$, which corresponds to a projected separation of 10000 au.

Within this radius all objects with an accurate five parameter astrometric solution ($\pi > 0$, $\pi/\sigma(\pi) > 3$, and $\mu/\sigma(\mu) > 3$) are selected in the *Gaia* DR2 to test their companionship with the exoplanet host stars. For all these sources the significance of the difference between their parallax and that of the exoplanet host stars *sig*-$\Delta\pi$, as well as their *cpm-index* are determined. All objects, which can be considered to be located at the same distance as the exoplanet host stars (i.e. *sig*-$\Delta\pi \leq 3$), are selected as companion candidates at first. The companionship of these candidates is then veri- or falsified according to their degree of common proper motion with the exoplanet host stars. Thereby, equidistant objects, which exhibit a *cpm-index* $\geq 3$, are considered as companions of the exoplanet host stars, i.e. the average proper motion of these systems is more than three times larger than the deviation of the proper motion of their individual components.

The results of the astrometric search for companions around the selected exoplanet host stars are illustrated in Fig. B1 – B4. The upper diagrams show the *cpm-index* of the detected sources plotted over the significance of the difference between their parallax and that of the exoplanet host stars *sig*-$\Delta\pi$, both in logarithmic scale. In these plots companions of the stars, i.e. comoving sources, which are located at the same distance as the exoplanet host stars, are expected within the white areas, while unrelated sources, whose companionship can clearly be ruled out, lay within the grey areas. The proper motion of all sources and the exoplanet host stars are illustrated in the middle diagrams. The *cpm-index* of the detected companions is illustrated here also geometrically with dark dotted lines. In the cases of HD 75289 and HD 170469 the uncertainties of the proper motions are not shown as they are typically smaller than the extent of the used symbols. The bottom diagrams show the distribution of all sources on the sky with the exoplanet host stars and their companions, indicated as filled dark circles, and unrelated sources as open circles, respectively.

As illustrated in Fig. B1 – B4, the astrometric search method, used in this survey on sources, which exhibit an accurate *Gaia* DR2 astrometry, is a reliable procedure to identify companions of the target stars and to clearly distinguish them from unrelated sources, located within the applied search radius.

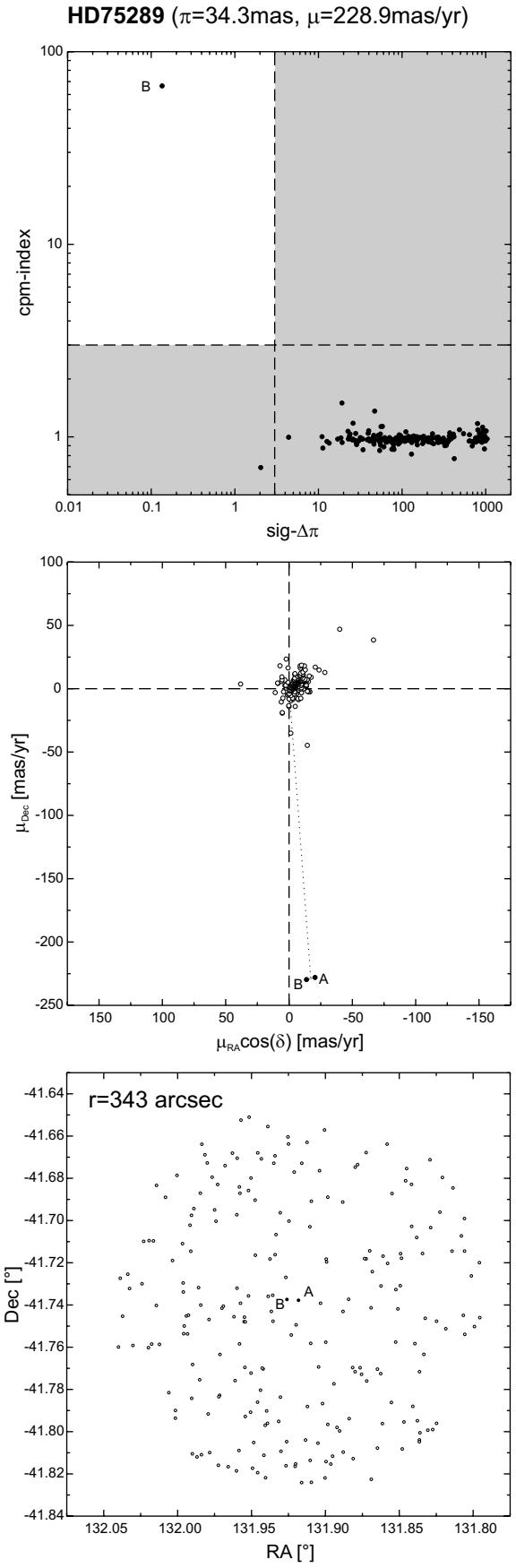


**Figure B1.** Astrometric search for companions around the exoplanet host star HD 75289.

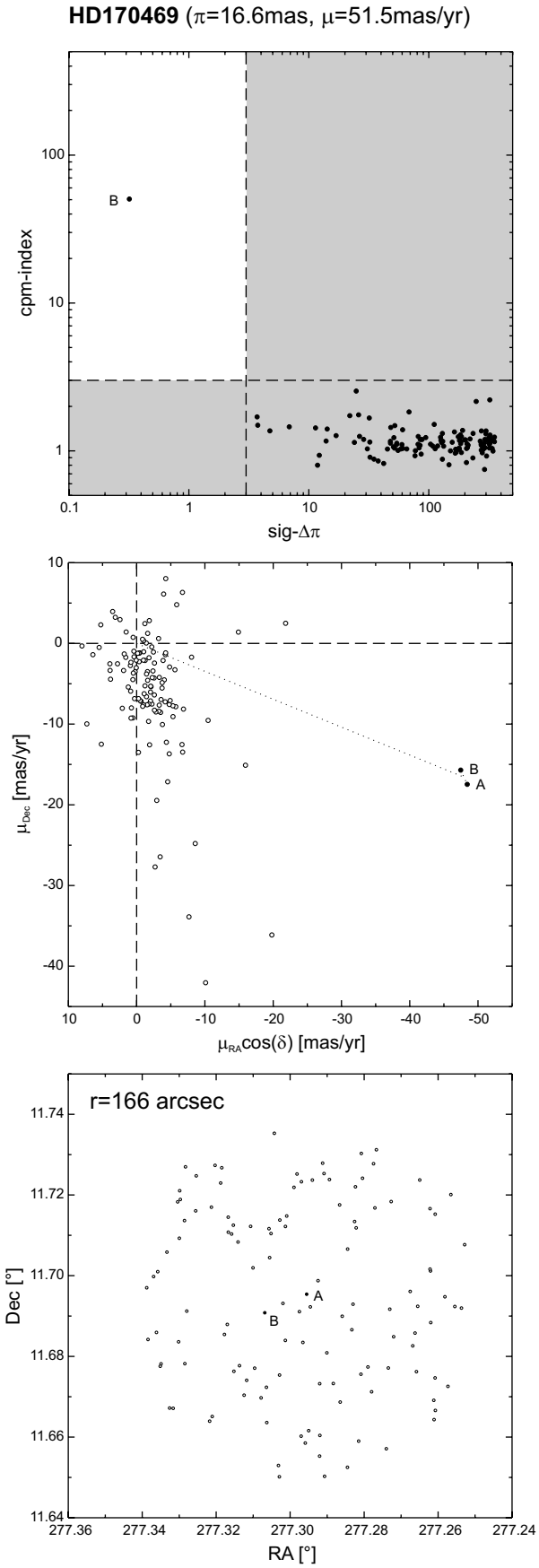


**Figure B2.** Astrometric search for companions around the exoplanet host star HD 170469.

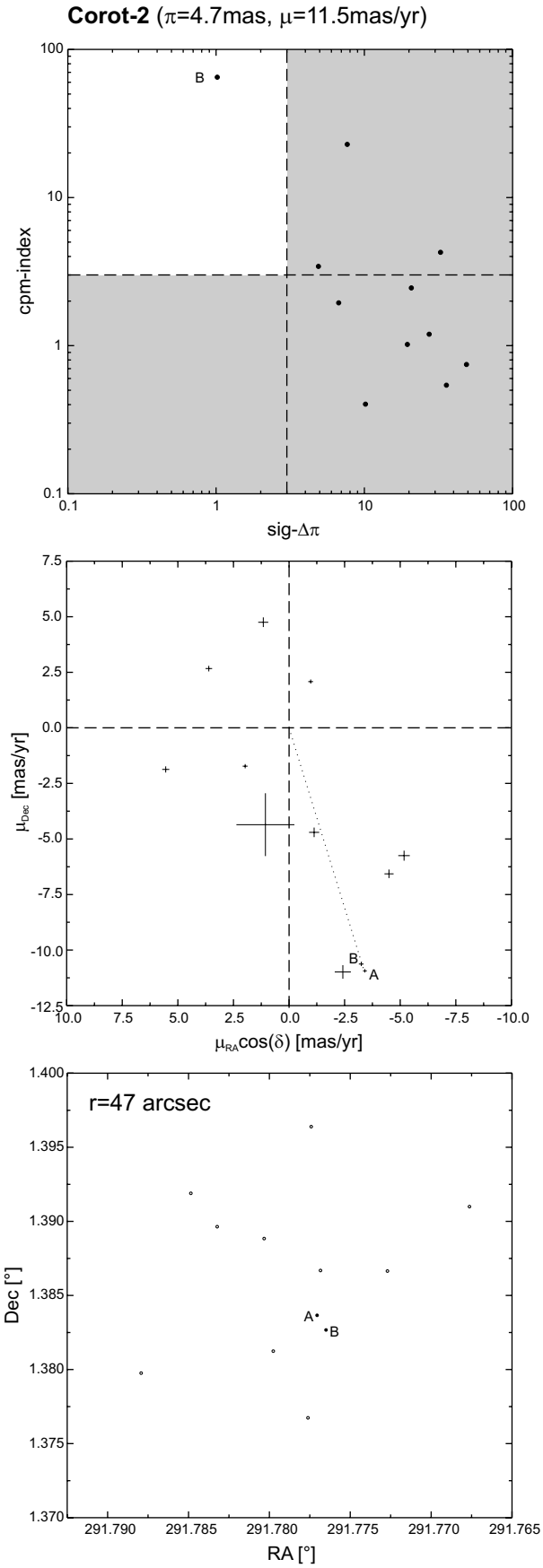


**Figure B3.** Astrometric search for companions around the exoplanet host star Corot-2.

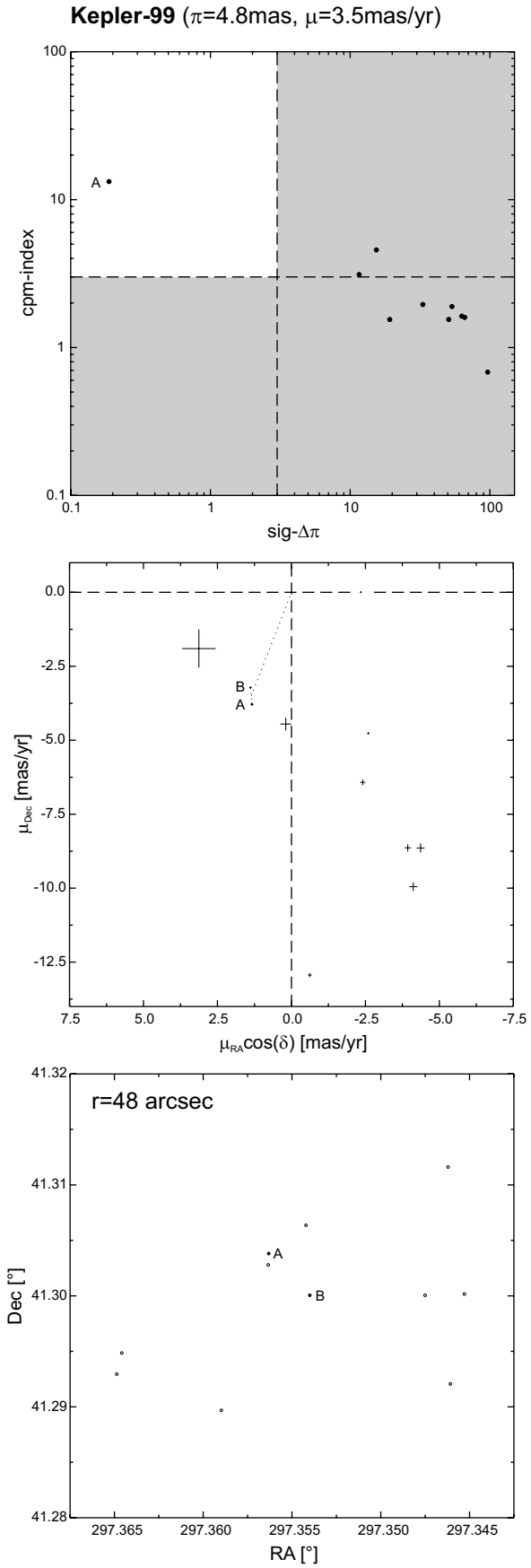


**Figure B4.** Astrometric search for companions around the exoplanet host star Kepler-99.