LOCAL ASSOCIATION, β PICTORIS AND TUCANA-HOROLOGIUM

We search for common proper motion companions to 210 nearby young stars (116 in the Local Association, 44 in Tucana-Horologium, and 50 in β Pictoris – Montes et al. 2001a; Torres et al. 2008). New young late-type secondaries, as those found here, can be excellent targets for high-contrast surveys for brown dwarf and planetary companions.

Stellar kinematic groups (sets of stars with coherent kinematics that have a common origin): Galactic space velocities UVW, VVV diagrams. Subgroups of the Local Association (⋆: LA), β Pictoris (⋆: β Pic) and Tucana-Horologium (⋆: Tuc-Hor)

COMMON PROPER-MOTION COMPANION CANDIDATES

We used the interactive software Aladin v5 and its application VDPilot:
- Load DSS2p2 image centred on target star
- Load 2MASS (for magnitudes, J, V and K)
- Load USNO-B1 for (proper motions)
- Load Simbad (for information on known objects)
- Cross-match 2MASS and USNO-B1
- Plot a proper-motion diagram with VDPilot
- Locate the target star in the diagram and look for objects around ±10 mas/a

Proper-motion diagram (μ_v, μ_w) of HD 143809 AB (uncorrected)

RESULTS

23 multiple system candidates found:
- 14 known common proper motion companions
- 9 unknown multiple systems (table below and upper right images), 1 of which has never been described in the literature: HD 143809 AB

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<tbody>
<tr>
<td>A</td>
<td>G5 V</td>
<td>163.2 ± 0.6</td>
<td>121.4 ± 0.5</td>
<td>6200 ± 300</td>
<td>LA</td>
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<td>B</td>
<td>K7</td>
<td>613.2 ± 0.6</td>
<td>258.4 ± 0.5</td>
<td>14500 ± 300</td>
<td>LA</td>
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<tr>
<td>A</td>
<td>G5 V</td>
<td>86.4 ± 0.6</td>
<td>253.4 ± 0.5</td>
<td>6700 ± 700</td>
<td>LA</td>
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<td>B</td>
<td>G0 V</td>
<td>707 ± 10</td>
<td>103.7 ± 0.5</td>
<td>35000 ± 2000</td>
<td>Tuc-Hor</td>
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<td>B</td>
<td>G5</td>
<td>21.8 ± 0.6</td>
<td>11.3 ± 0.5</td>
<td>920 ± 30</td>
<td>Tuc-Hor</td>
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<tr>
<td>A</td>
<td>M2 V</td>
<td>1410 ± 10</td>
<td>65.3 ± 0.5</td>
<td>64000 ± 2000</td>
<td>Tuc-Hor</td>
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<tr>
<td>A</td>
<td>F5 V</td>
<td>550 ± 10</td>
<td>110.4 ± 0.5</td>
<td>29900 ± 500</td>
<td>β Pic</td>
</tr>
<tr>
<td>B</td>
<td>M1 V</td>
<td>420 ± 10</td>
<td>170.7 ± 0.5</td>
<td>20000 ± 800</td>
<td>β Pic</td>
</tr>
<tr>
<td>A</td>
<td>K6 V</td>
<td>328 ± 10</td>
<td>153 ± 0.5</td>
<td>15700 ± 800</td>
<td>β Pic</td>
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The HD 143809 AB system was subject of a dedicated astrometric, photometric and spectroscopic follow-up study. First, we confirmed the common proper motion of the pair using 11 astrometric epochs separated by over 56 years. Next, we collected BVR images and low-resolution spectra (grating G100) with the CAOS instrument at the 2.2 m Calar Alto telescope. While the primary is a known G0V star with Lithium (FeII λ 6103 Å) = 103 Mά, López-Santiago et al. 2010) with an estimated age of t > 80-120 My in the Local Association (Montes et al. 2001b), the new companion at s = 6700 AU is a M1.0-1.5Ve star with Chromospheric Hα, Hδ and Hγ emission. The heliocentric distances derived from its spectral type and photometry matches the one of the primary measured by Hipparcos (ζ ± 8 ± 8 pc).

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References

An Aladin-based search for proper-motion companions to young stars in the Local Association, Tucana-Horologium and β Pictoris

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Abstract. We have used the Aladin sky atlas of the Virtual Observatory to look for new common proper-motion pairs in three young stellar kinematic groups: Local Association (LA, θ = 10-120 Ma), Tucana-Horologium (Tuc-Hor, θ = 30 Ma) and β Pictoris (β Pic, θ = 12 Ma). We have found 9 new and 14 known common proper-motion companions to the 210 investigated stars. With the CAOS instrument at the 2.2m Calar Alto telescope, we have investigated in detail the HD 143809 AB system, which is formed by a G0V primary star and a previously unknown young M1.0-1.5Ve star.

THE 9 NEW PROPER-MOTION PAIRS

HD 143809 AB data
- α = 16 02 16.91
- β = +03 38 41.2
- μ_α = +31.0 ± 1.3 mas/a
- μ_β = +40.7 ± 1.3 mas/a
- B = 14.87 mag
- V = 13.65 mag
- R = 12.90 mag
- I = 11.20 mag
- u = 10.85 mag
- g = 15.98 mag
- r = 13.12 mag
- i = 12.44 mag
- I = 10.35 mag
- V = 9.67 mag
- K = 9.47 mag

CAFOS spectra of HD 143809 A & B (without flux correction)