

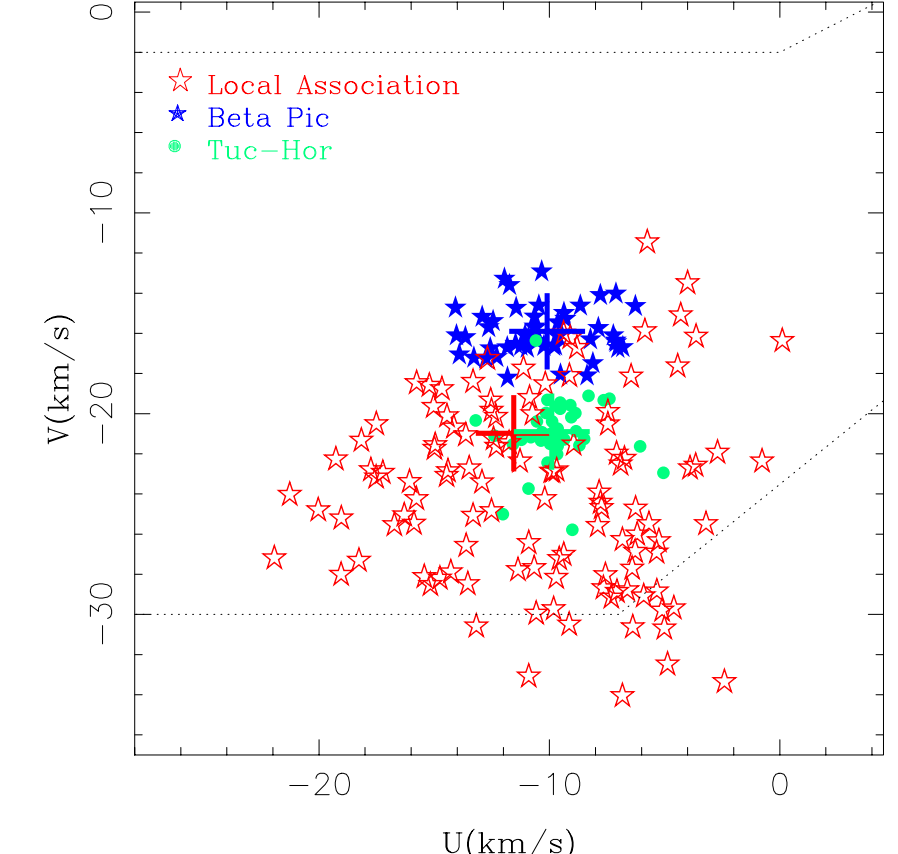
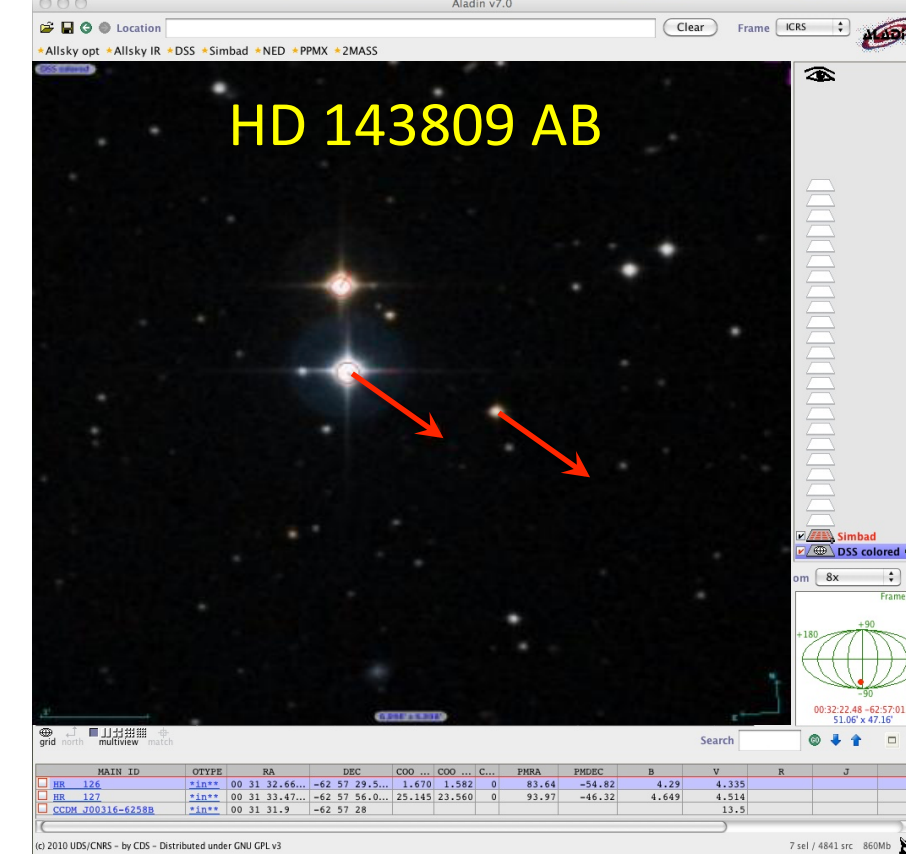
# Searching for common proper-motion companions in the Local Association and its young kinematic subgroups

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**Abstract.** We describe the results of an ongoing project aimed to identify new members of young associations by searching for common proper-motion companions (CPMCs) to already-known members. We have used the *Aladin* sky atlas of the Virtual Observatory and the 2MASS, USNO-B1 and PPMXL astro-photometric catalogues to look for new CPMC candidates in the the Local Association and its young kinematic groups (Tucana-Horologium,  $\beta$  Pictoris, AB Doradus...). We have discovered several new late-type stellar companions. For one of the new identified objects, we have taken low-resolution spectroscopy to confirm its young nature and characterise its stellar properties. A detailed study of Tucana-Horologium has provided an unprecedented view of the moving group nucleus around  $\beta^{01+02+03}$  Tuc, which lies at the centre of the remnant of the cluster that originated the group.

**Methodology.** We used the virtual observatory software *Aladin* v7 and its tool *VOPlot* to develop this project. The CPMC search radius was 30 arcmin. For each star, we plotted proper-motion diagrams from the output of 2MASS, USNO-B1 and PPMXL cross-matches to locate the target star and CPMC candidates separated by less than 15% in proper motion. The candidates are subject of confirmation through precision astrometric and spectro-photometric analyses. We split our sample into Local Association and Tucana-Horologium.



## Local Association

166 studied members (Montes et al. 2001b; Torres et al. 2008).

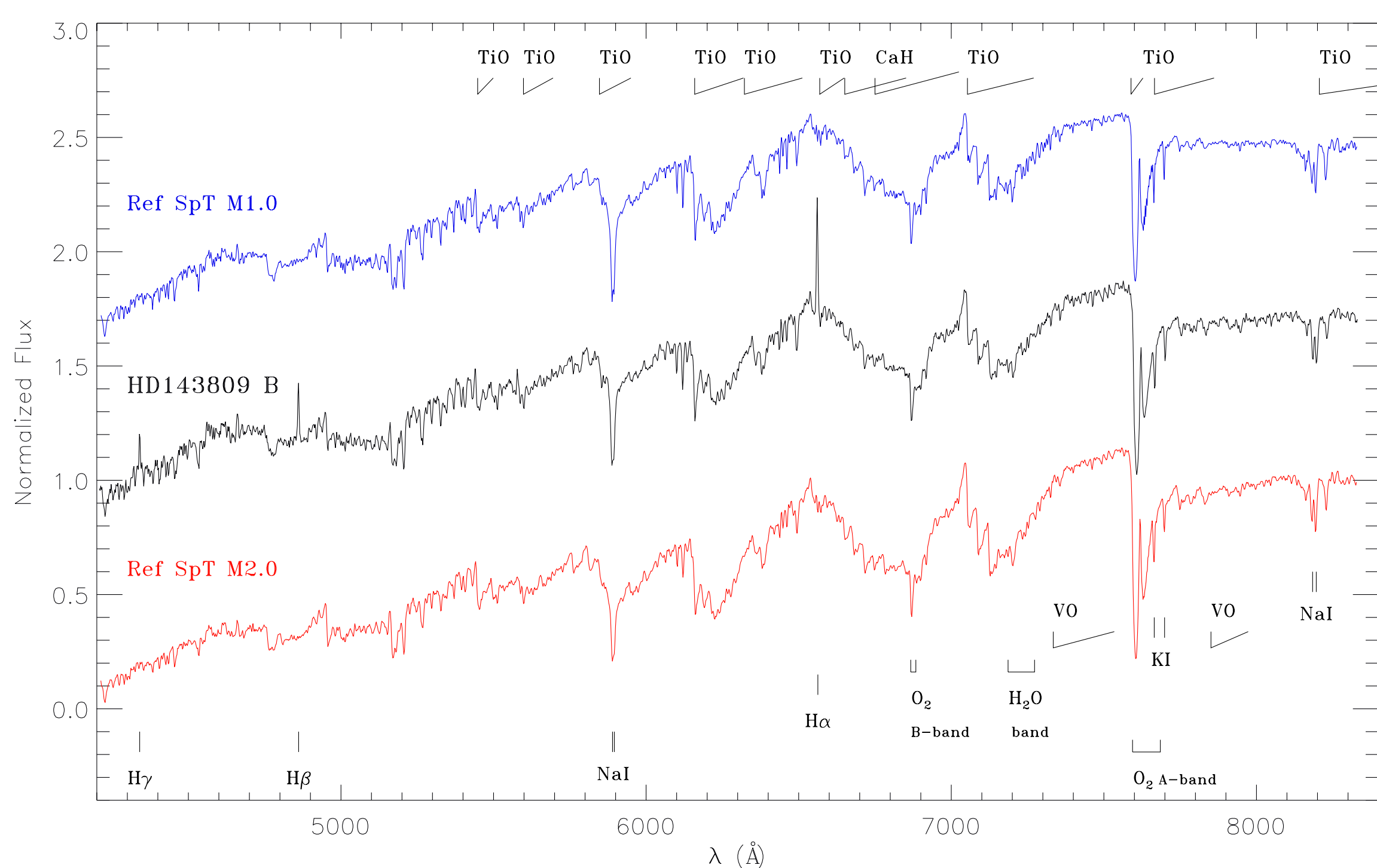
21 multiple system candidates confirmed:

- 16 known CPMCs.
- 5 unknown CPMCs (see table below); The secondary of **HD 143809 AB** has never been described before in the literature.

Name	Sp. type	$\rho$ [arcsec]	$\theta$ [deg]	$s$ [AU]	MG
A HD 82939	G5 V	163.2 $\pm$ 0.6	121.4 $\pm$ 0.5	6200 $\pm$ 300	LA
B GJ 9303	K7 V				
A EX Cet	G5 V	613.2 $\pm$ 0.6	258.4 $\pm$ 0.5	14500 $\pm$ 300	LA
B LP 648-20	M3.5 Ve				
A HD 143809 A	G0 V	<b>86.4 <math>\pm</math> 0.6</b>	<b>253.4 <math>\pm</math> 0.5</b>	<b>6700 <math>\pm</math> 700</b>	<b>LA</b>
<b>B HD 143809 B</b>	<b>M1.0-1.5 Ve</b>				
A HD 173167	F5 V	550 $\pm$ 10	110.4 $\pm$ 0.5	29900 $\pm$ 500	$\beta$ Pic
B TYC 9073-762-1	M1 Ve				
AB HD 199143 AB	F7 V + ...	328 $\pm$ 10	138.4 $\pm$ 0.5	15700 $\pm$ 800	$\beta$ Pic
C AZ Cap	K6 Ve				

## HD 143809 A and B

Using CAFOS@ 2.2m Calar Alto spectra we classify HD 143809 B as an active M1.5V star with H $\alpha$ , H $\beta$  and H $\gamma$  in emission (see figure below).



HD 143809	A	B
$\alpha, \delta$ [J2000]	16 02 22.42, +03 39 07.2	16 02 16.91, +03 38 41.2
$\mu_\alpha \cos \delta, \mu_\delta$ [mas/a]	-49.1 $\pm$ 1.4, -40.0 $\pm$ 1.4 (van Leeuwen 2007)	<b>-51.0 <math>\pm</math> 1.3, -40.7 <math>\pm</math> 1.3</b> (11 astrometric epochs over 56 years)
Sp. type	G0V	<b>M1.5Ve</b> (CAFOS@ 2.2m Calar Alto)
$EW(H\alpha)$ [ $\text{\AA}$ ]	+0.07 $\pm$ 0.01 (López-Santiago et al. 2010)	<b>-5.7 <math>\pm</math> 0.4</b> (CAFOS@ 2.2m Calar Alto)
Additional information	$EW(Li I) = +103 \text{ m\AA}$ (López-Santiago et al. 2010) $\tau \approx 80-120 \text{ Ma}$ (Montes et al. 2001a)	$BVRI \text{ ugri JHKs}$ photometry agrees with spectro-photometric distance

## Tucana-Horologium

75 studied members (Montes et al. 2001b; Torres et al. 2008; Kiss et al. 2011; Zuckerman et al. 2011).

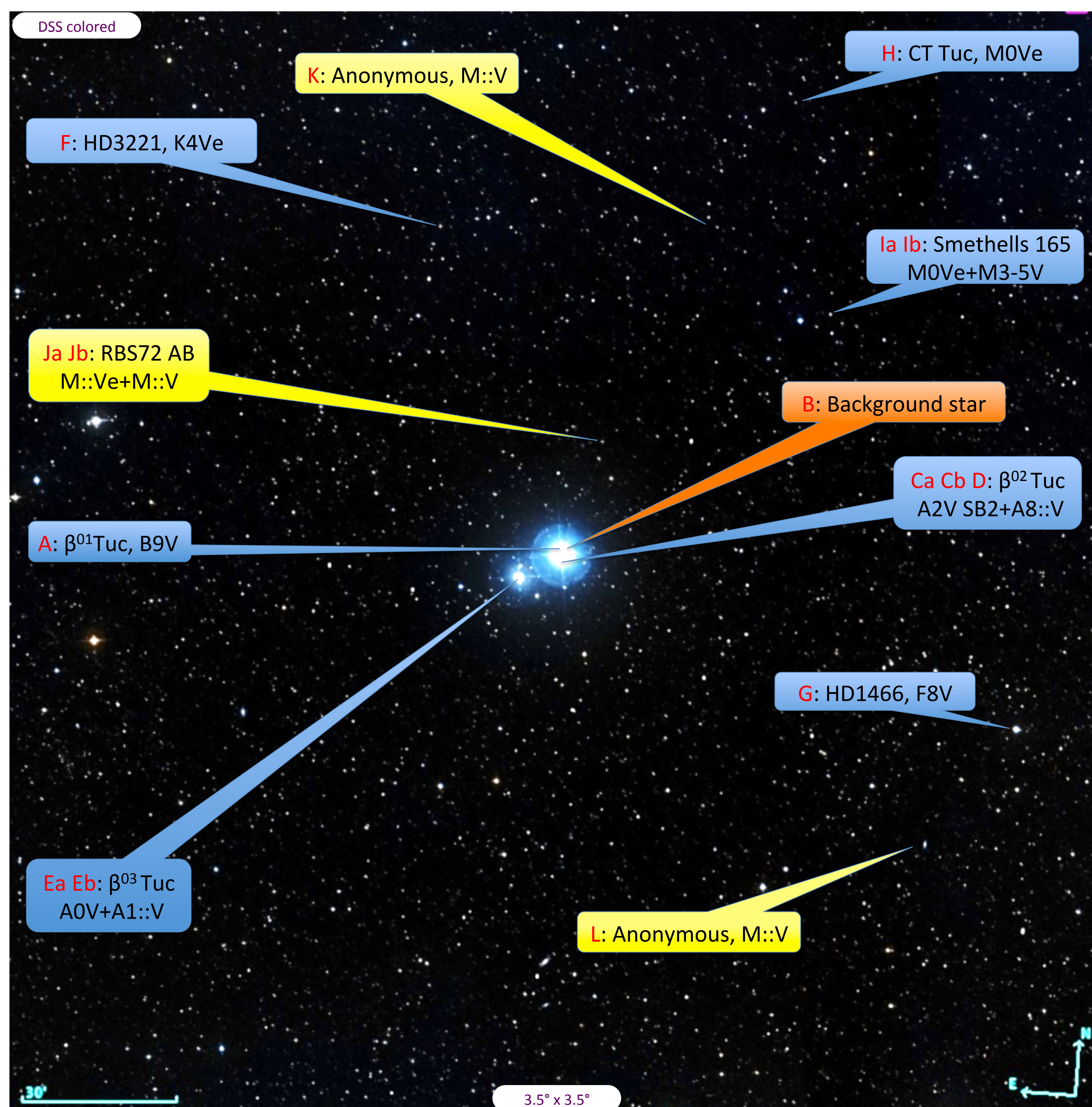
47 CPMC candidates outside the Tucana-Horologium core:

- 11 known CPMCs.
- 11 CPMC candidates with secondaries in Simbad.
- 23 CPMC candidates with unknown secondaries (under investigation).
- 2 unknown CPMCs up to now (see table below).

Name	Sp. type	$\rho$ [arcsec]	$\theta$ [deg]	$s$ [AU]
A HD 13183	G7 V	707 $\pm$ 10	103.7 $\pm$ 0.5	35000 $\pm$ 2000
B CD-53 413	G5 V			
A HD 207575	F6 V	1410 $\pm$ 10	65.3 $\pm$ 0.5	64000 $\pm$ 2000
BC HD 207964 AB	F1 III + ...			

## Tucana-Horologium core

- 7 B-A-F and 4 K-M already known stars (Shaya & Olling 2011, see picture below).
- 4 early and mid-M stars proposed here (in yellow); the faintest ones are close to the substellar boundary.



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