Searching for close companions in young stellar systems

Mariangela Bonavita[1]

R. Jayawardhana[1] , A. Brandeker[2],
M. van Kerkwijk[1] D. Cuong Nuyen[3]

[1] Department of Astronomy and Astrophysics, University of Toronto
[2]Department of Astronomy, Stockholm University
[3]University of Florida

VLT/CRIRES RV survey of resolved tight (≤ 1") binaries and triple systems in Cha I

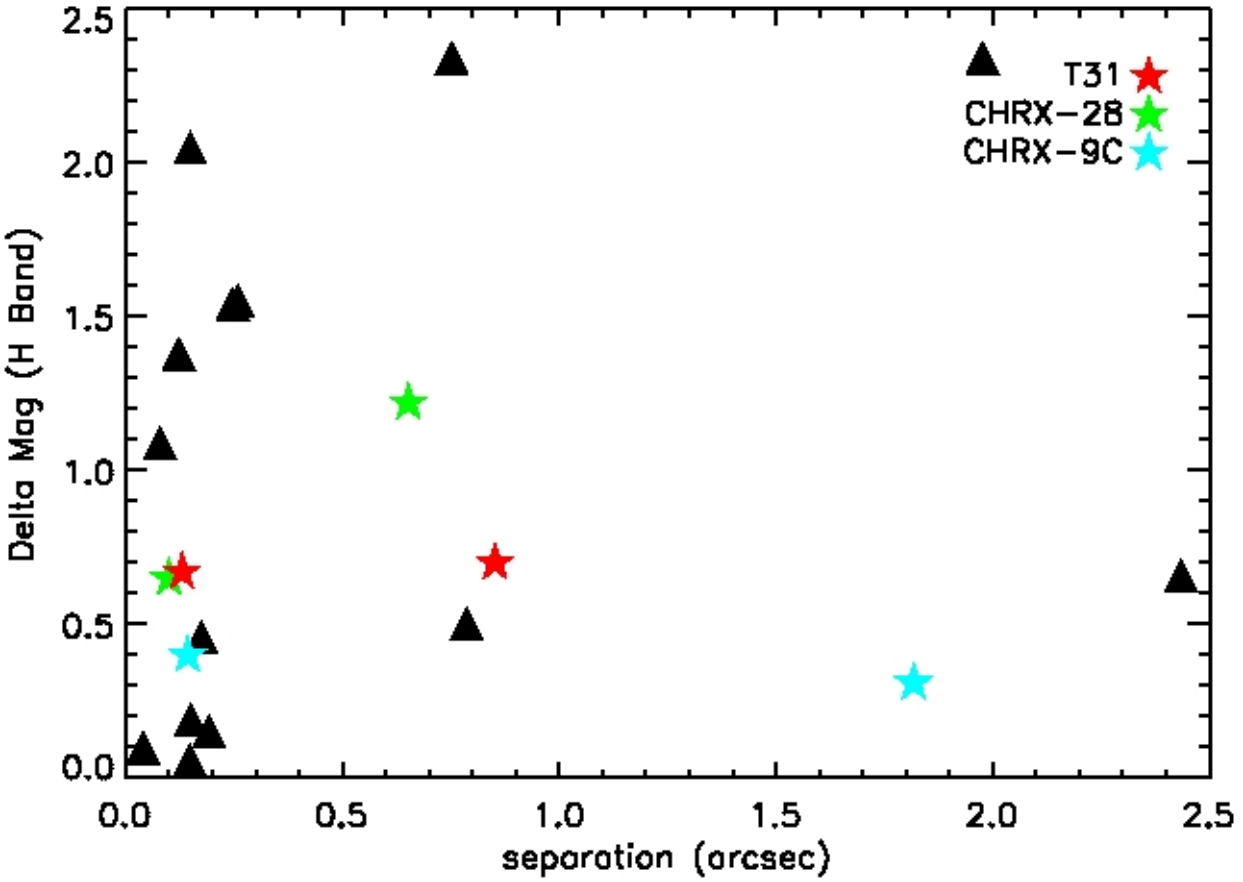
- Follow-up of the VLT/NACO imaging survey (Lafreniere et al. 2008) that lead to the discovery of 30 binaries and 6 triples.
- Focused on the tightest binaries, where the gravitational interaction from a new found companion might be of importance

GOALS:

- ✔ Search for tight binaries to refine the estimate of the multiplicity fraction
- ✔ Investigate the long-term stability of multiples at a young age

Stellar Sample

17 tight binary systems 3 triple systems, sub-arcsecond separation

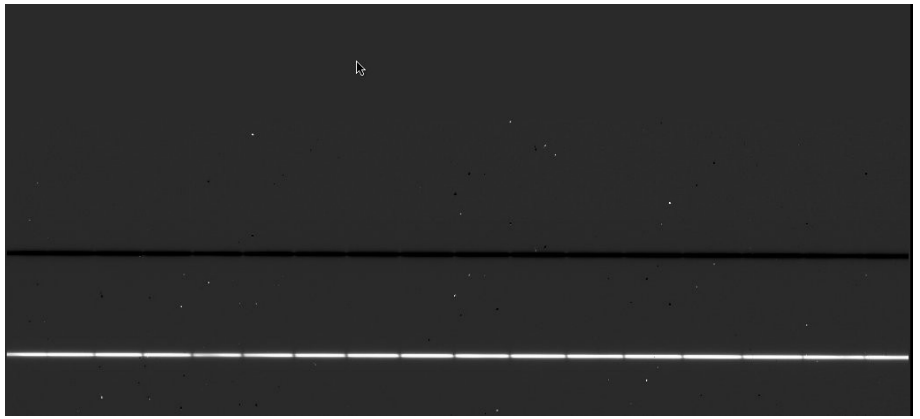


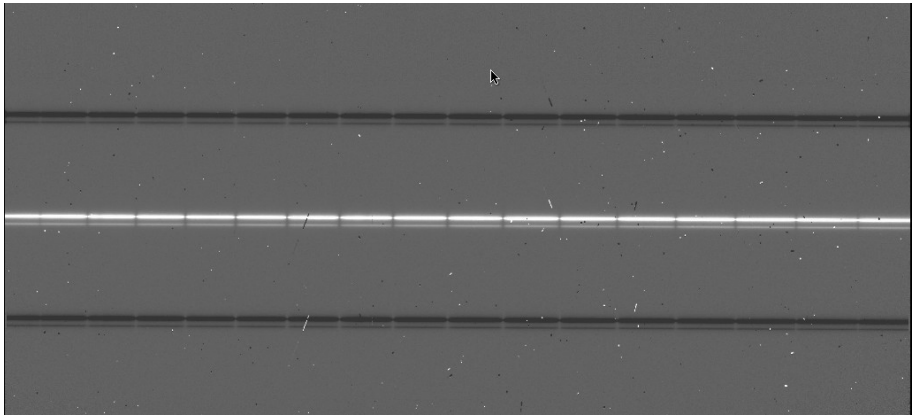
Observing Strategy

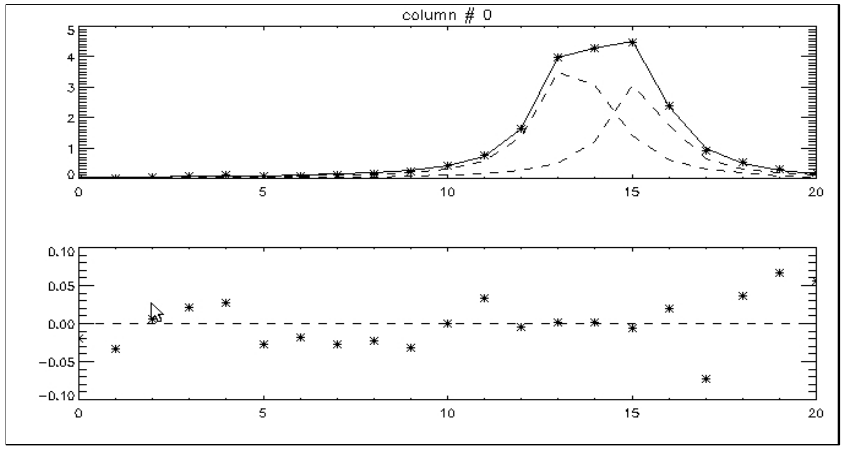
- Long slit mode, with the slit placed over both the components
- Telluric lines used as simultaneous wavelength reference

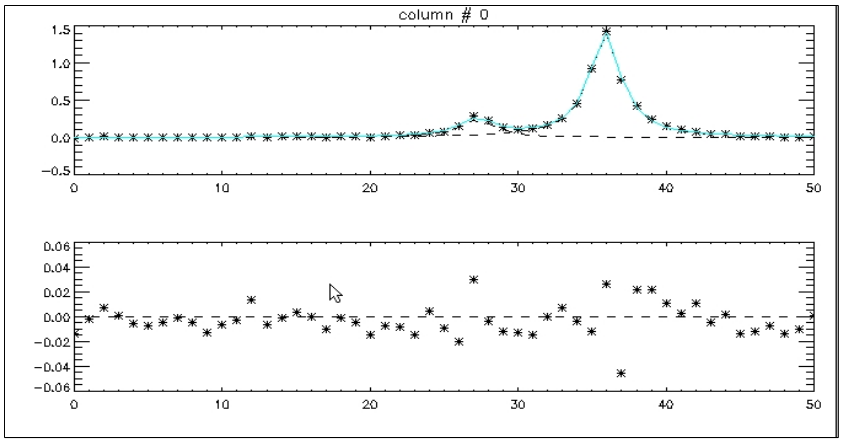
Spectral Extraction

At every wavelength, the peak(s) are fitted with a sum of two Moffat functions, using the values of the separation and flux ratio from the NACO data as first guesses.



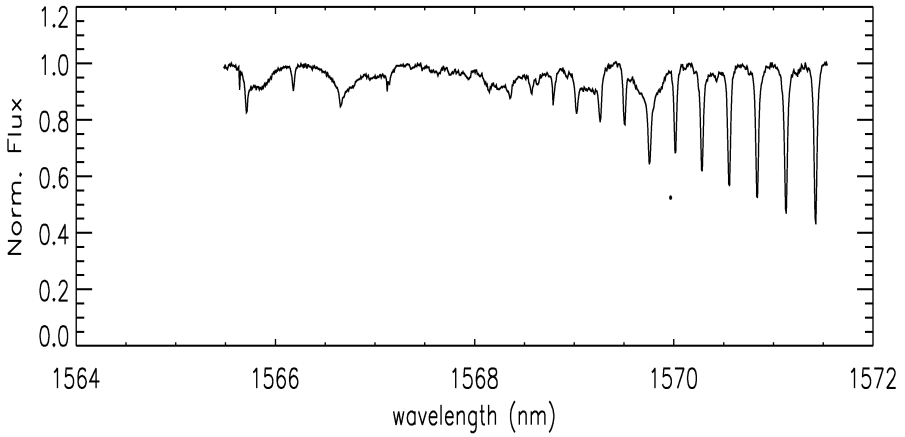


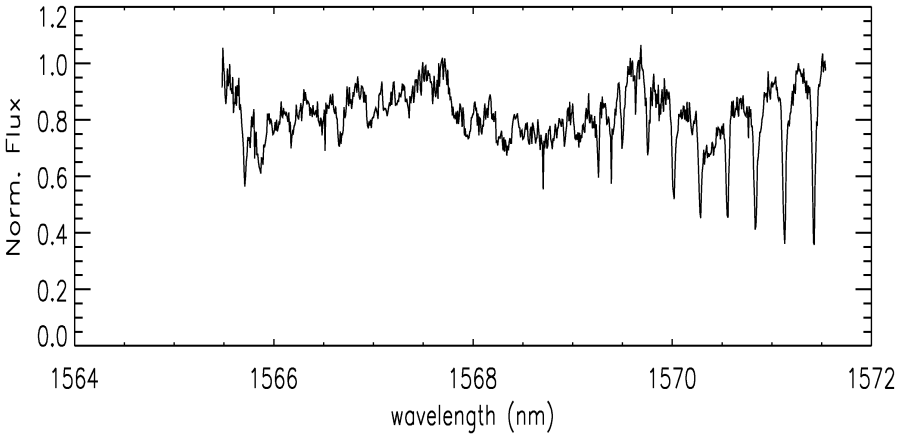


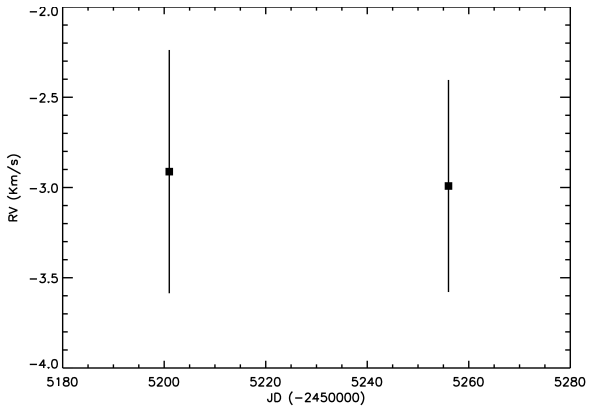


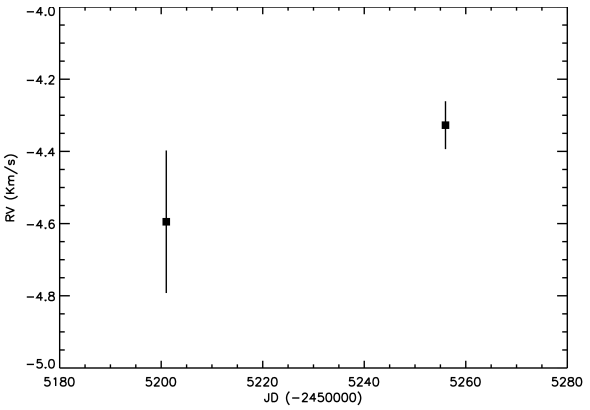
Results

At every epoch each system is observed at 4 nodding positions.
For each one of them the spectra of the two components are extracted and a RV shift is obtained for each one of them, using the first epoch as reference.
The final value of the RV being the average over the nodding positions.









Relative (EP02/03 to EP01) RV shift estimate with an error of about 100–300 m/s

Conclusions:

Using the telluric lines as reference, we reached a precision of about 100–300 m/s

If confirmed, the null detection would allow us to constraint the population of companions down to brown dwarf msses.

Further analysis is ongoing.

Poster G11

for more detail