

New candidates for Chromospherically Young Kinematically Old stars

Eduardo **Machado Pereira**
Helio Jaques **Rocha Pinto**

Observatório do Valongo
Universidade Federal do Rio de Janeiro

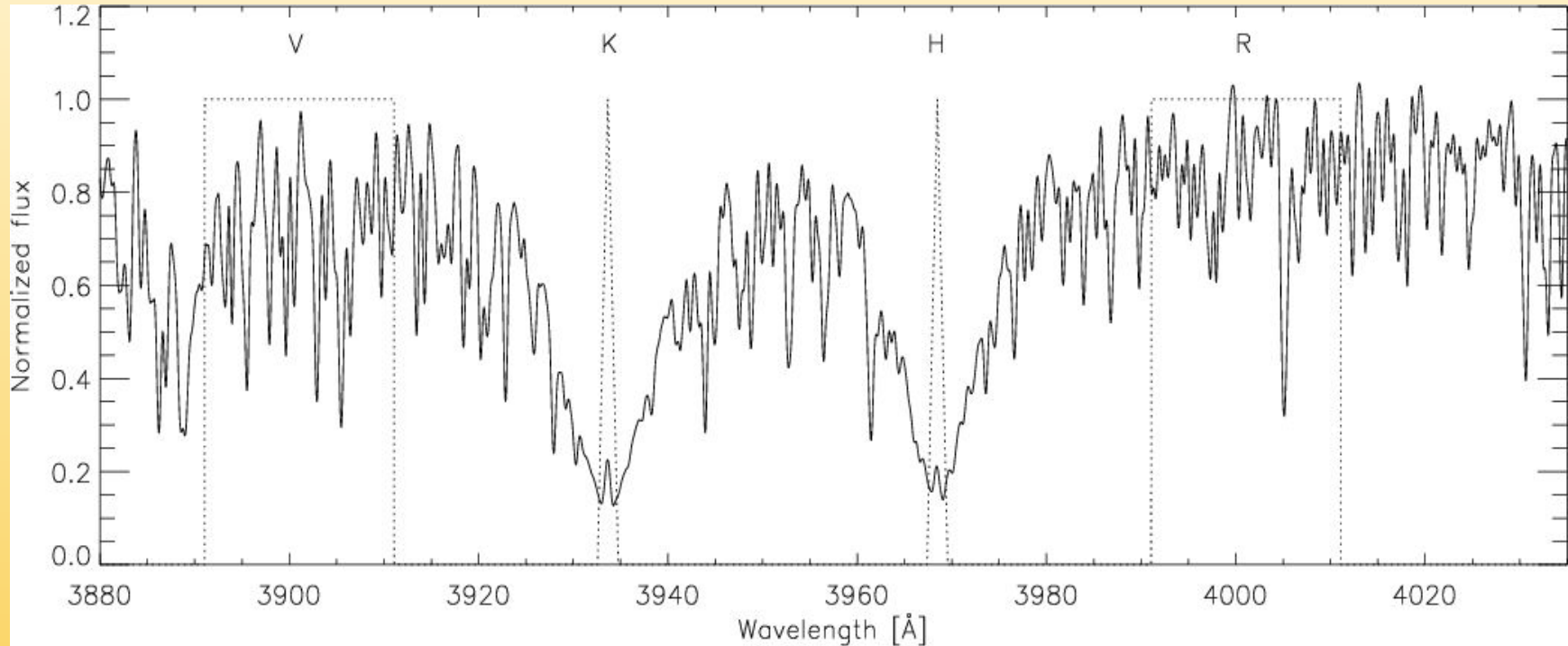


Summary

- Chromospherically active stars
- High space velocities components
 - Coalescence hypothesis
 - Lithium observations

Chromospheric activity

$$\log R'_{HK}$$



Schröder+09

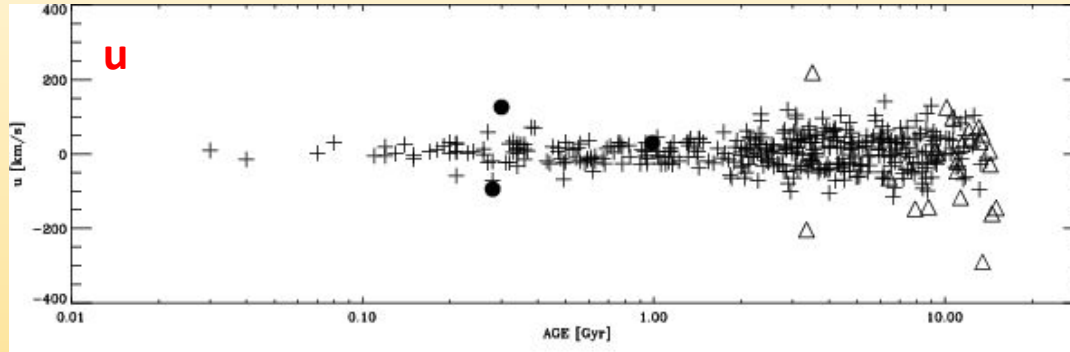
Kinematical features

- U: center
- V: rotation
- W: north pole

Kinematical features

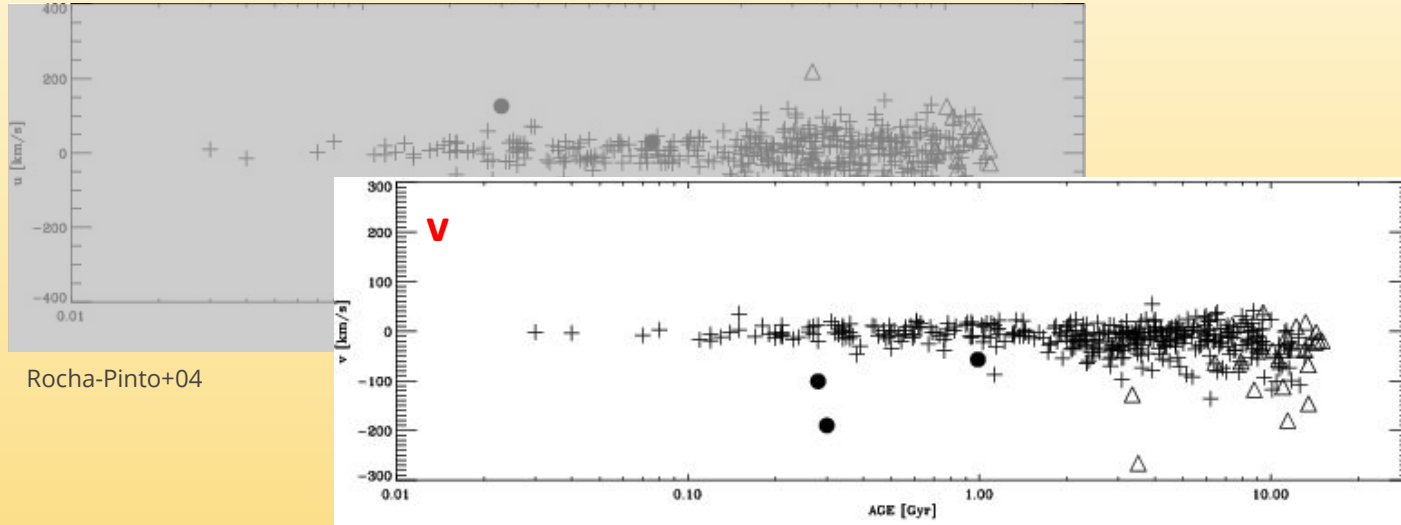
- U: center
- V: rotation
- W: north pole
- Velocities dispersion

Kinematical features



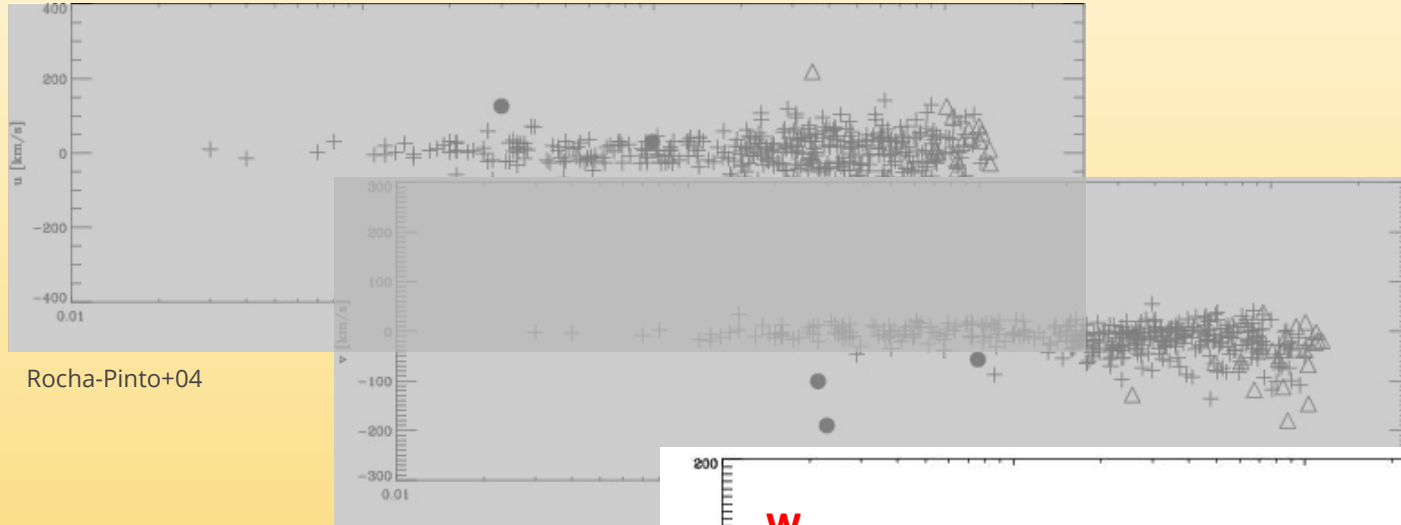
Rocha-Pinto+04

Kinematical features

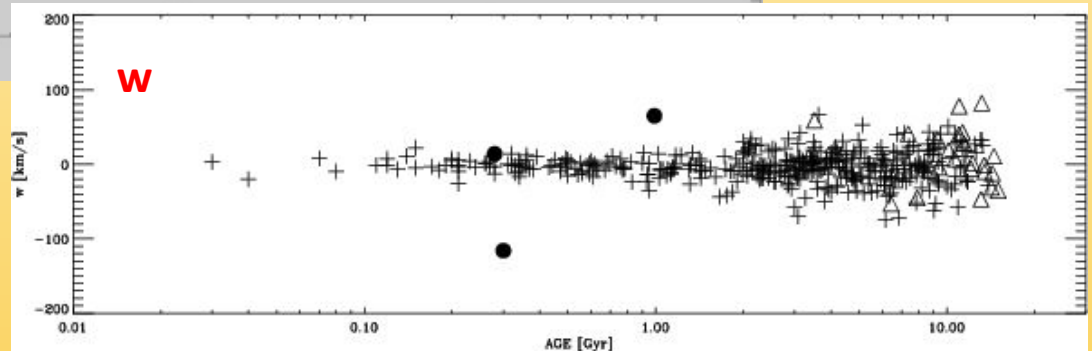


Rocha-Pinto+04

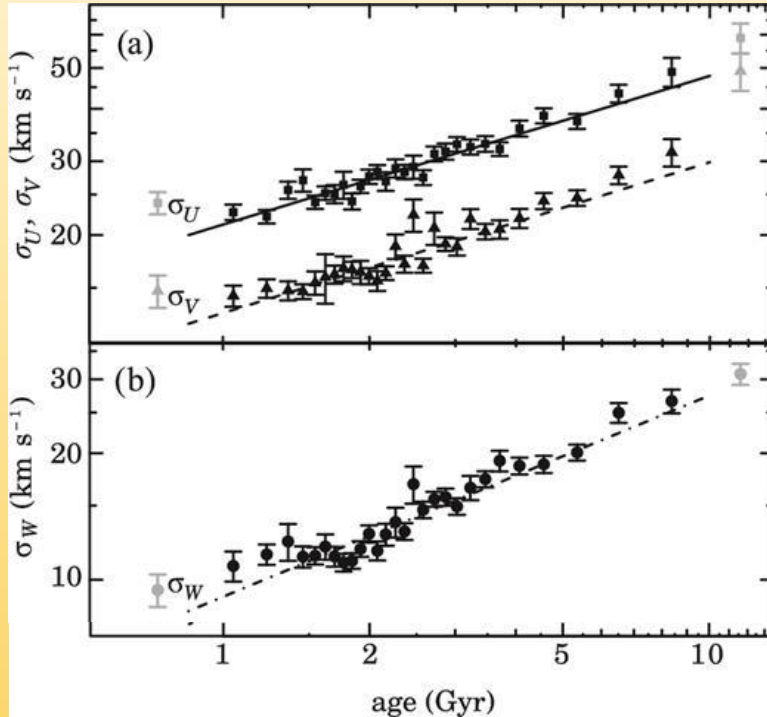
Kinematical features



Rocha-Pinto+04

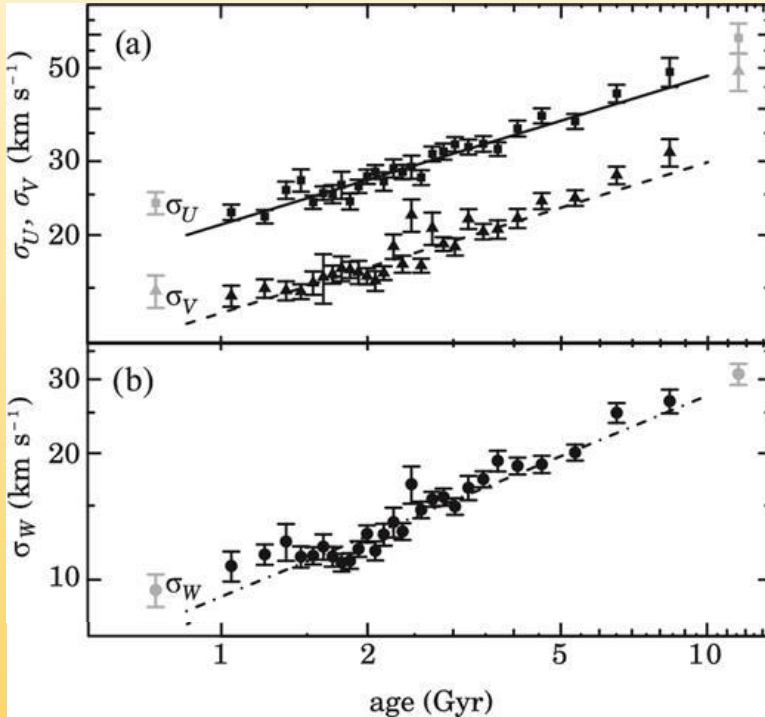


Stellar ages



Almeida-Fernandes&Rocha-Pinto18

Stellar ages

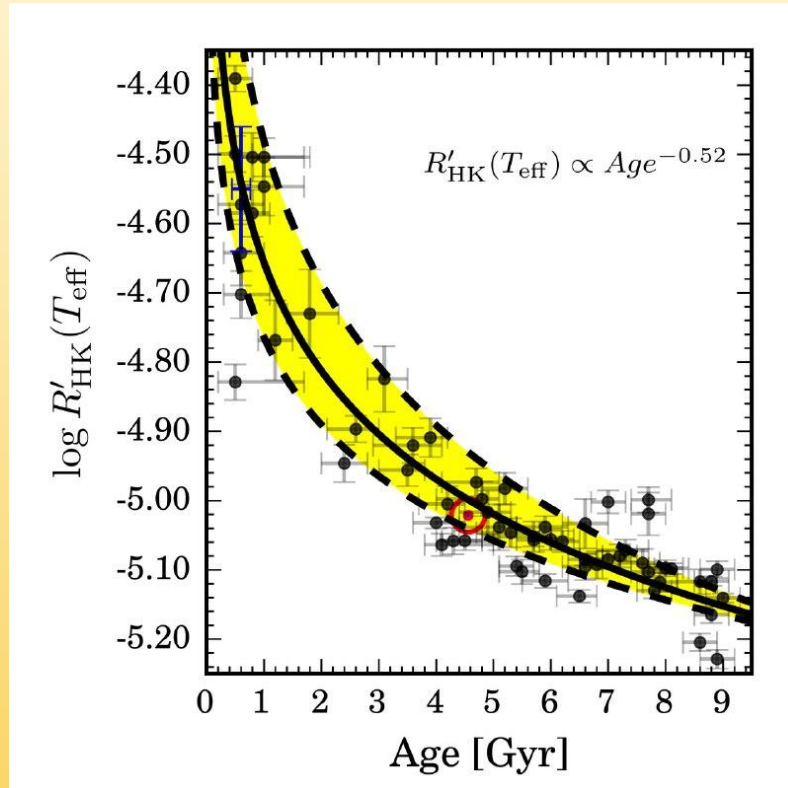


Almeida-Fernandes&Rocha-Pinto18

Diffusion of stellar orbits (Wielen+77)

High space velocities components:
older stars

Stellar ages



Lorenzo-Oliveira+18

Chromospheric activity decreases with time (Soderblom+91)

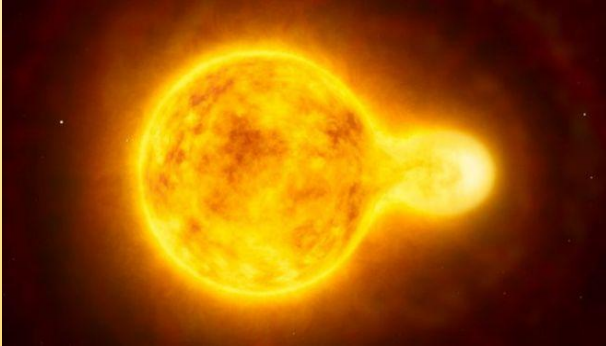
Intense chromospheric activity:
chromospherically young stars

CYKOs identification

Formation scenario: coalescence

CYKOs identification

Formation scenario: coalescence



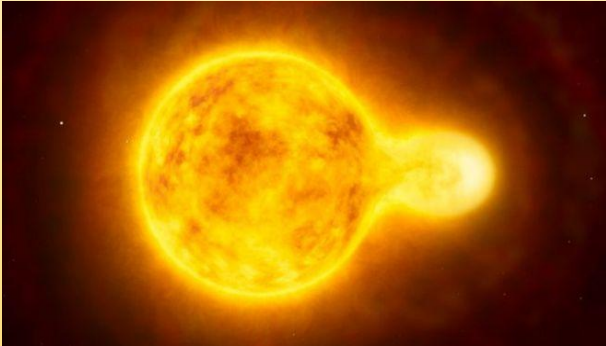
Science photo library

CYKOs identification

Formation scenario: coalescence

Short-period binaries:

- a. magnetized winds
- b. angular momentum loss
- c. magnetic braking



Science photo library

CYKOs identification

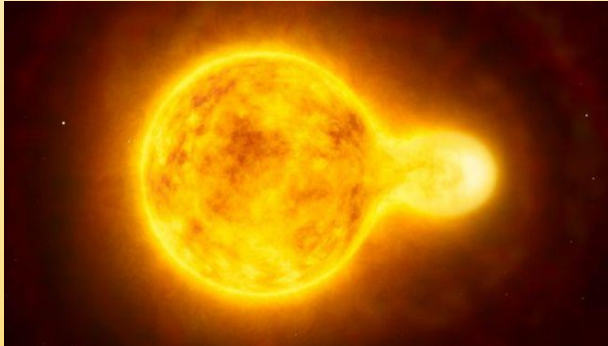
Formation scenario: coalescence

Short-period binaries:

- a. magnetized winds
- b. angular momentum loss
- c. magnetic braking

CYKOs formation hypothesis:

- (c.) offset by progressive approximation of the pair
 - eventual contact and merge:
 - **active fast star**



Science photo library

CYKOs identification

Methodology

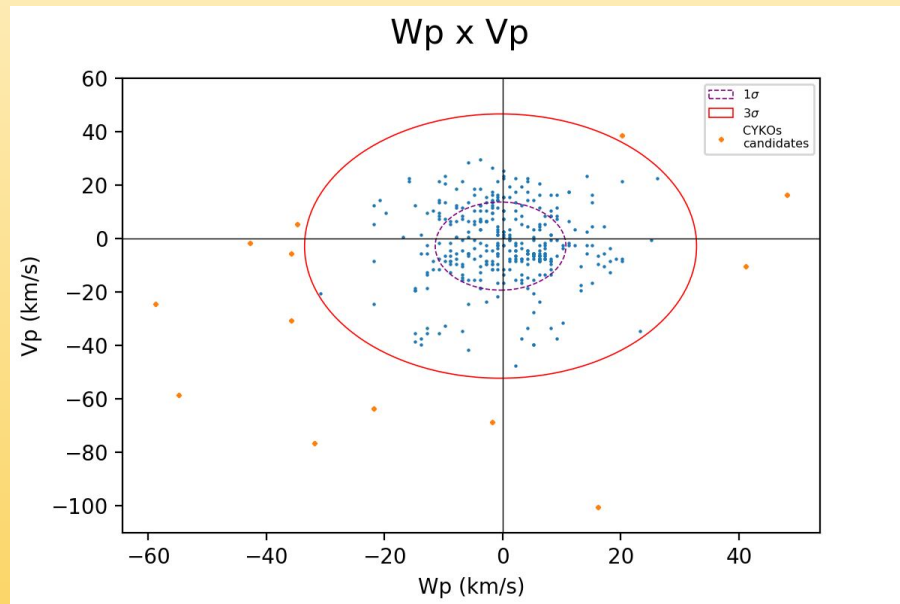
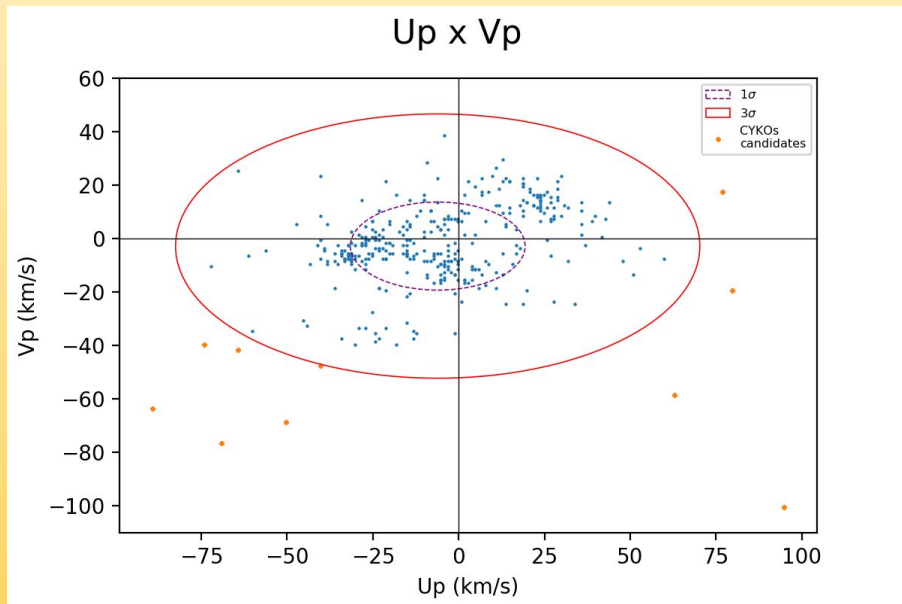
- Rocha-Pinto et al., 2002:
 1. Chromospherically active stars (with known u, v, w)
 2. Space velocities diagram:
 - Stars lying beyond a 3σ dispersion limit
 3. Remove binaries

CYKOs identification

- Initial sample (assembled by Rocha-Pinto; ~1.3k stars)
 - Geneva-Copenhagen survey (Holmberg et al., 2009)
- New samples:
 - Murgas et al., 2013
 - Velocities and chromospheric activity (~2.3k stars)
 - Boro-Saikia et al., 2018
 - Chromospheric activity (~4.5k stars) → GCS

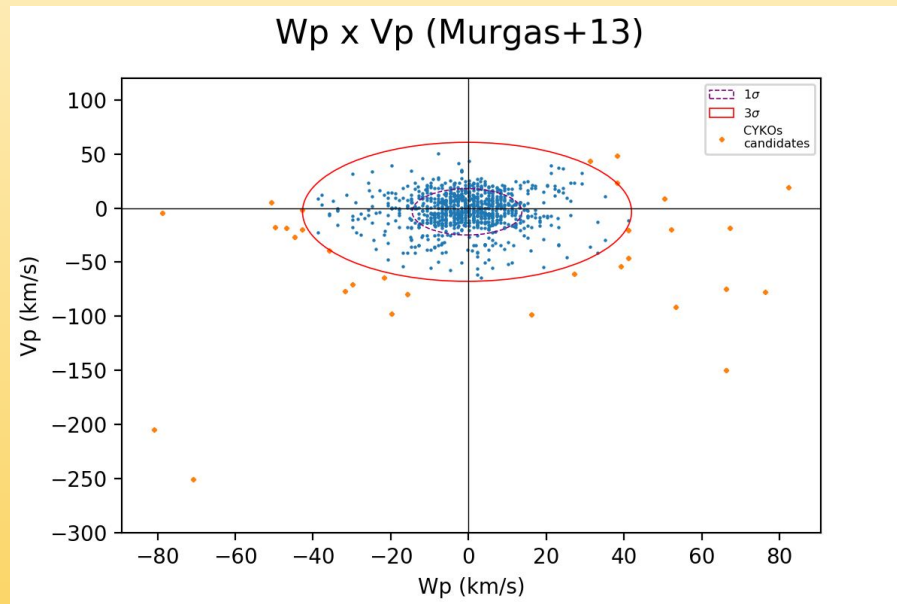
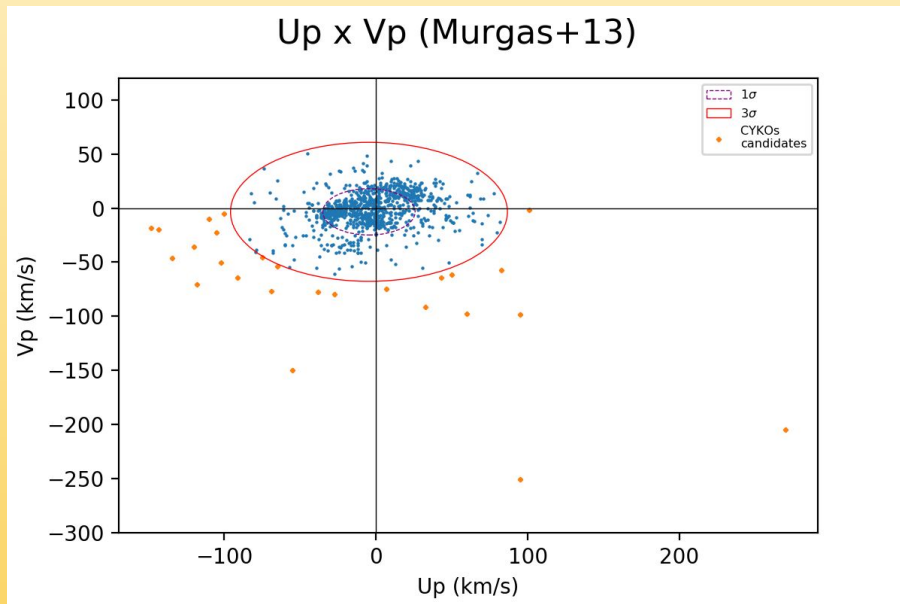
CYKOs identification

Rocha-Pinto(& GCS) initial sample: 18 candidates



CYKOs identification

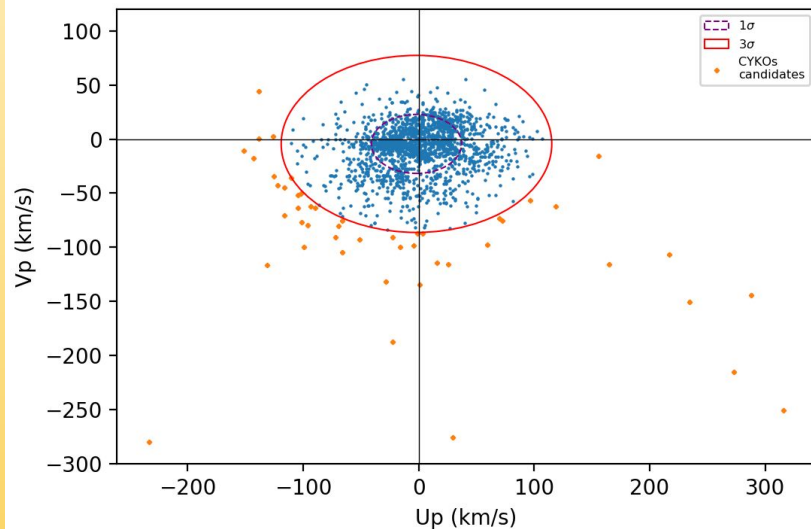
Murgas+13 sample: 42 candidates



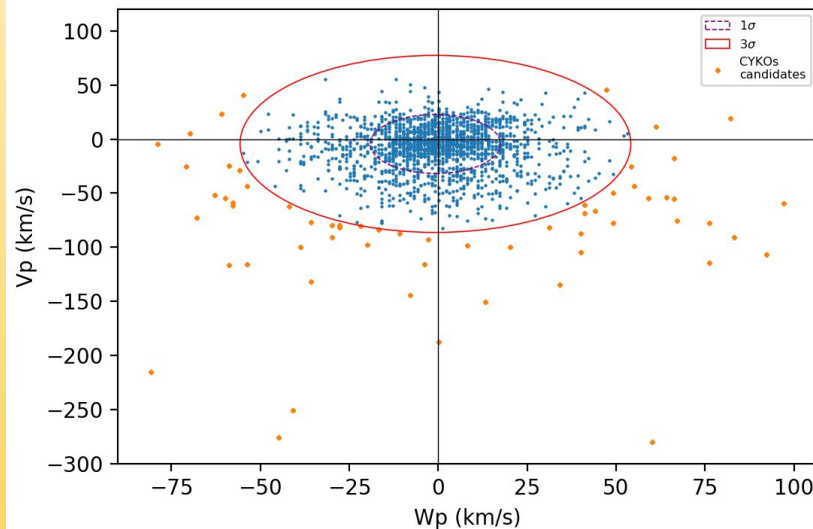
CYKOs identification

Boro-Saikia+18 (& GCS) sample: 82 candidates

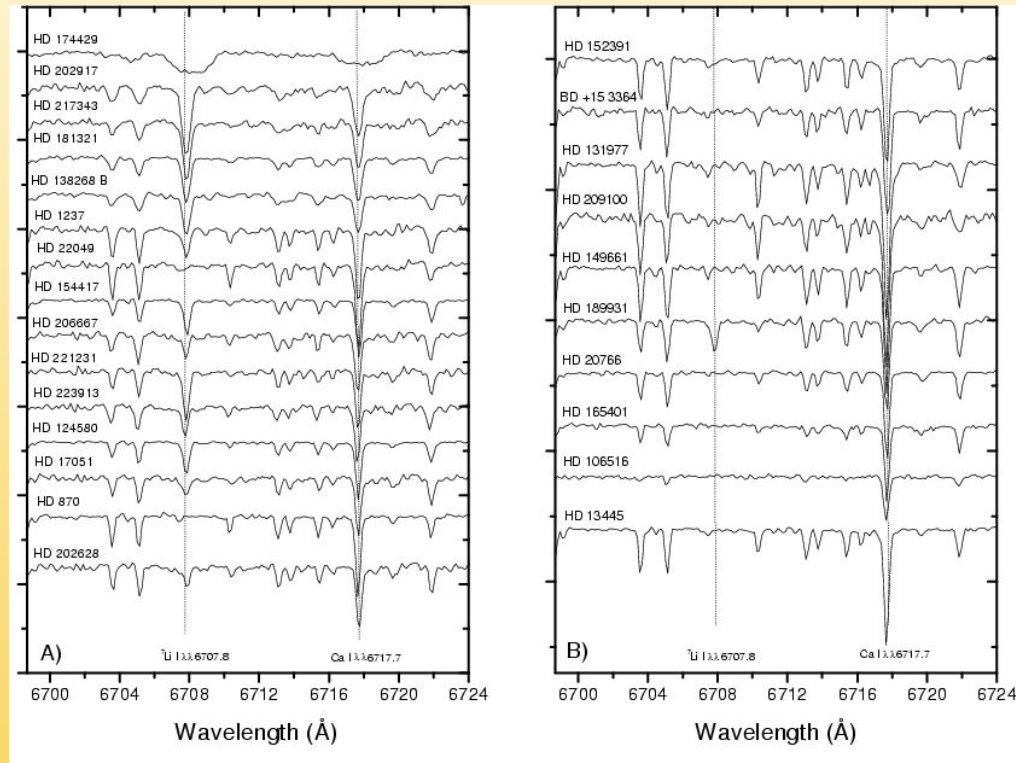
Up x Vp (GCS vs. BS+18)



Wp x Vp (GCS vs. BS+18)



CYKOs identification



Rocha-Pinto+02

Next steps

- Cross all samples
 - new chromospheric activity catalogue?

Next steps

- Cross all samples
 - new chromospheric activity catalogue?
- GAIA kinematical data

Next steps

- Cross all samples
 - new chromospheric activity catalogue?
- GAIA kinematical data
- Lithium?
 - Observations:
 - OPD (data reduction stage; one more observing run to go)
 - Existing databases:
 - ESO-HARPS

Summary

- Chromospherically active stars
- High space velocities components
 - Coalescence hypothesis
 - Lithium observations