Tendencies of PMS research in Brazil

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Some important historical steps

•1989- **TW Hya** de la Reza, Torres, Quast, Castilho, Vieira (ApJ 343 L61) called attention on puzzling existence of T Tauri stars far form any molecular cloud. TW Hya was a prototype.

•started 1990 - **The PDS (Pico dos Dias) survey**

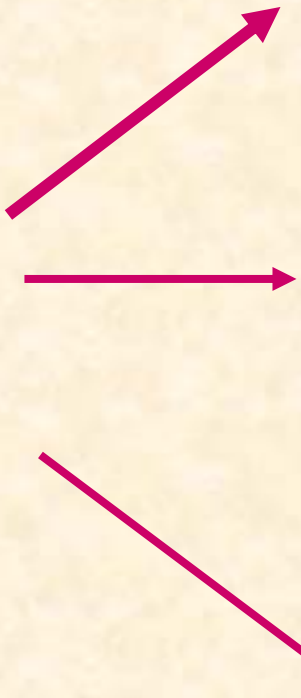
Previous surveys for new T Tauri stars always searched around known star forming regions (Orion, ρ Oph, etc).

PDS is the first large-scale unbiased survey **Method:**

- use known T Tauri stars to verify the typical IRAS colors [12-25] and [25-60]
- select in IRAS catalog all objects within this range of color. 850 objects found.
- verify if the IRAS source has an optical counterpart, with magnitude 13 or brighter (Guide Star Catalog), remove galaxies, planetary nebulae, etc.
- take spectra of objects in the 655-673 nm range, which includes Hα and resonant Li I line

First PDS results: Gregorio-Hetem, Lépine, Quast, Torres, de la Reza (1992 AJ)
Torres, Quast, de la Reza, Gregorio-Hetem, Lépine (1995 AJ)

150 stars observed, 50 new T Tauri, 37 new AeBe
30 previously known observed, photometry and spectroscopy of all objects, and many interesting parallel results: Li-rich giants, 1 quasar, ... FU Ori-like, etc



Stellar groups and associations, dynamics of star forming regions, connection with molecular clouds. Question: what triggers star formation? how star formation propagates?

After PDS

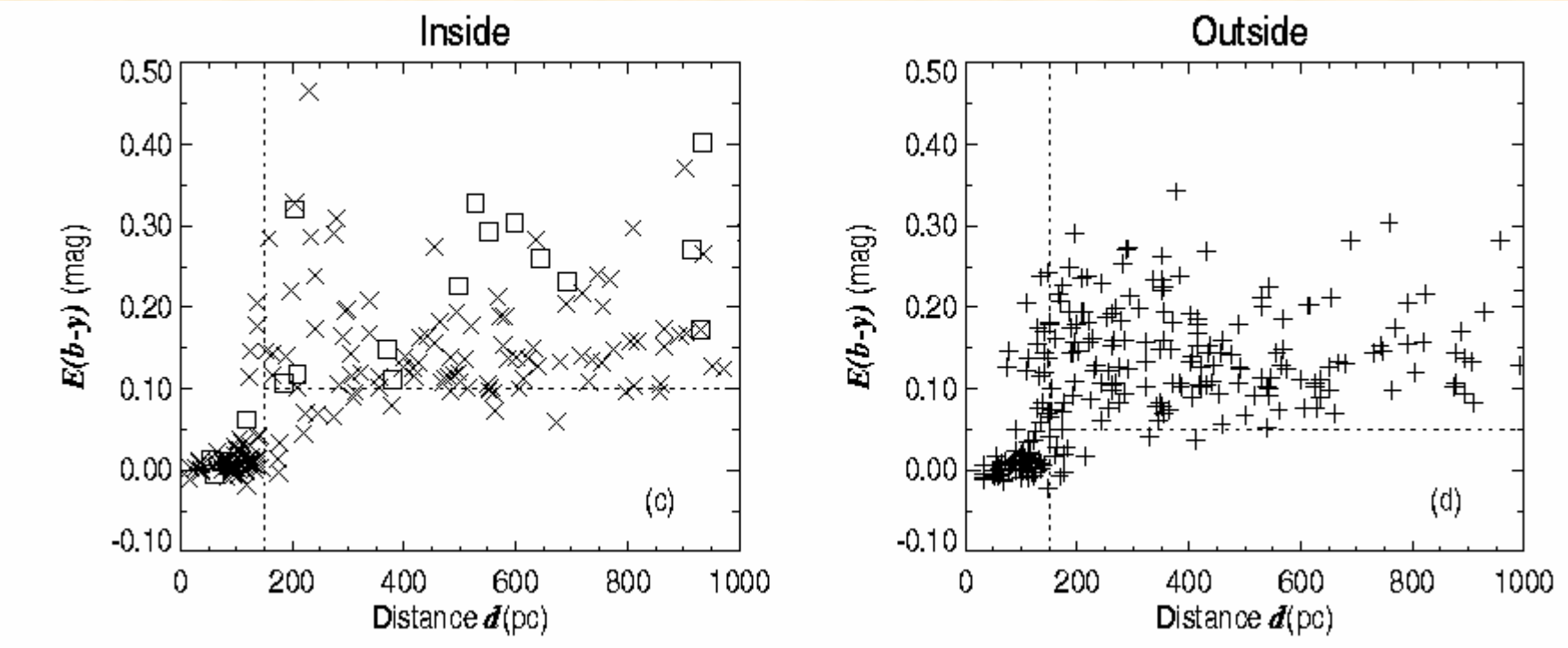
T Tauri stars and AeBe: circumstellar structure, disks, binaries, spectral energy distribution, variability. Questions: how to classify PMS objects, how do the disk and the star evolve during PMS phase?

metalliciy abundance, rotation

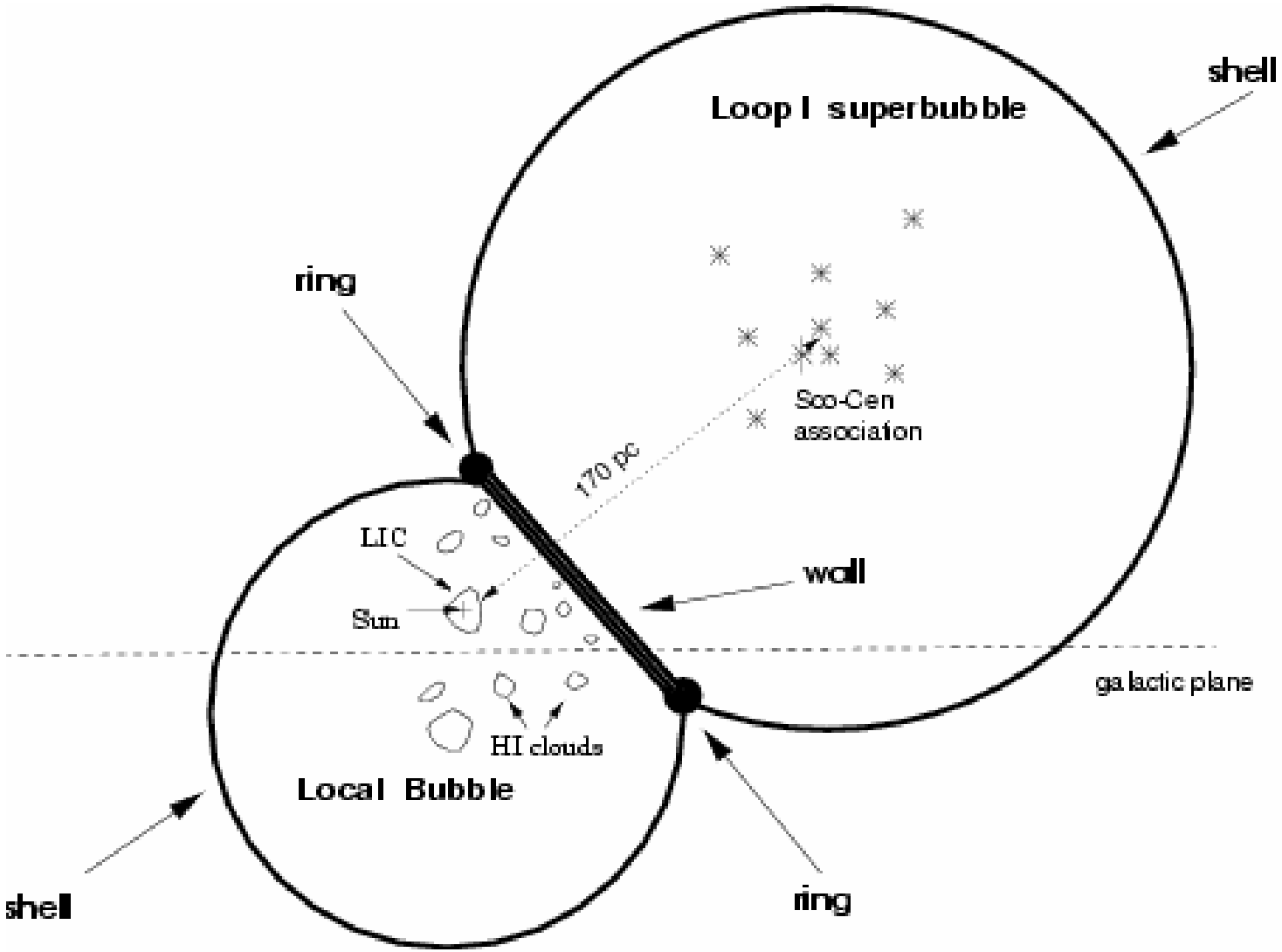
Connections with IM,

large-scale SF

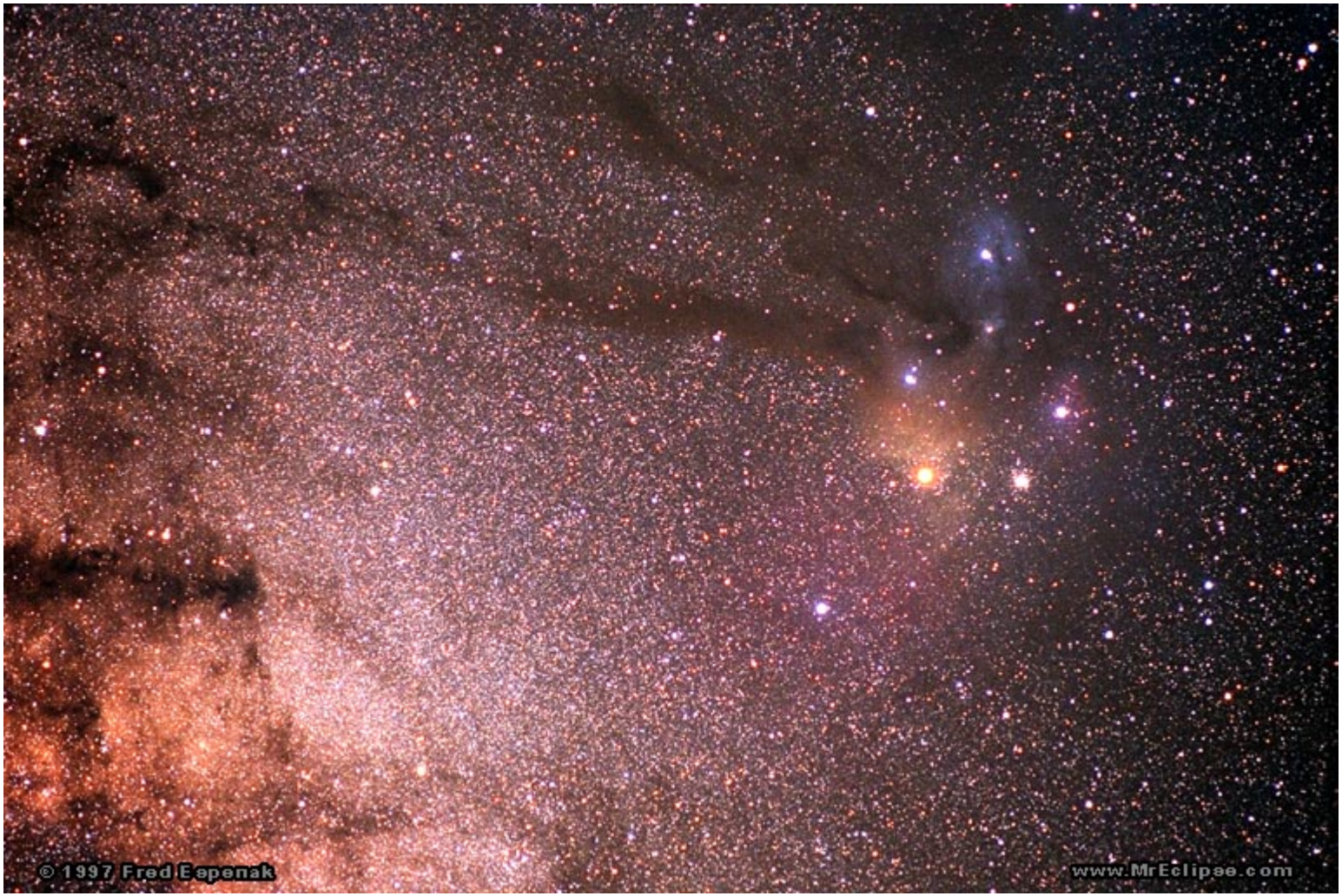
Conections with interstellar medium



Belo Horizonte group: Gabriel Franco, Wagner Corradi, and others



The bubble theory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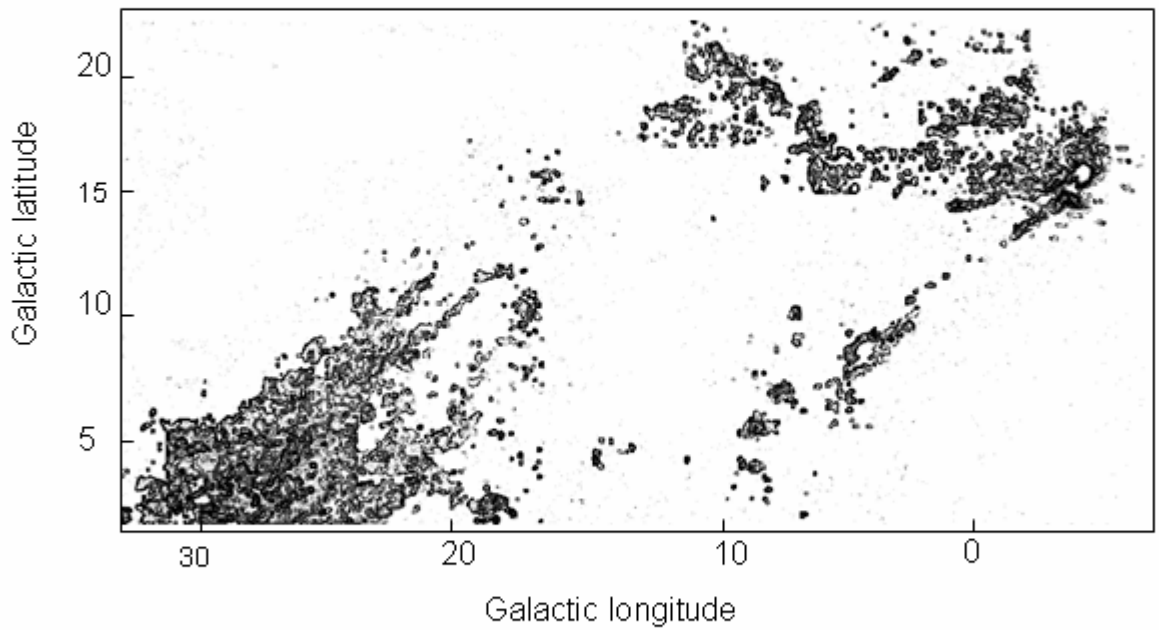


Filaments connecting the galactic plane to the rho Oph –Sco-Cen groups of young stars

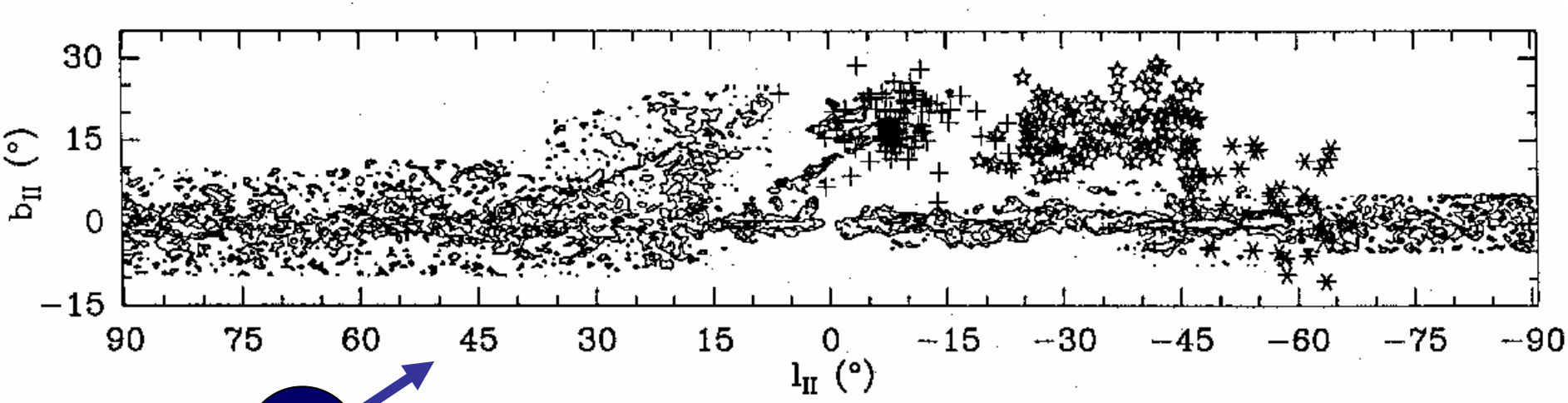


Fig. …irs of the ρOph region, and members of the OB associations listed by de Geus et al. (1991); crosses: Upper Scorpius; open stars …urus; filled stars: Lower Centaurus

HVC impact model Lépine & Duvert 1994

ment, concerns the nature of the Monoceros R2 cloud, at about $l = 215°$, $b = -12°$. It seems unlikely that this cloud formed independently from the rest of the complex; it is probably the far edge of the shocked layer, situated at about 620 pc from us.

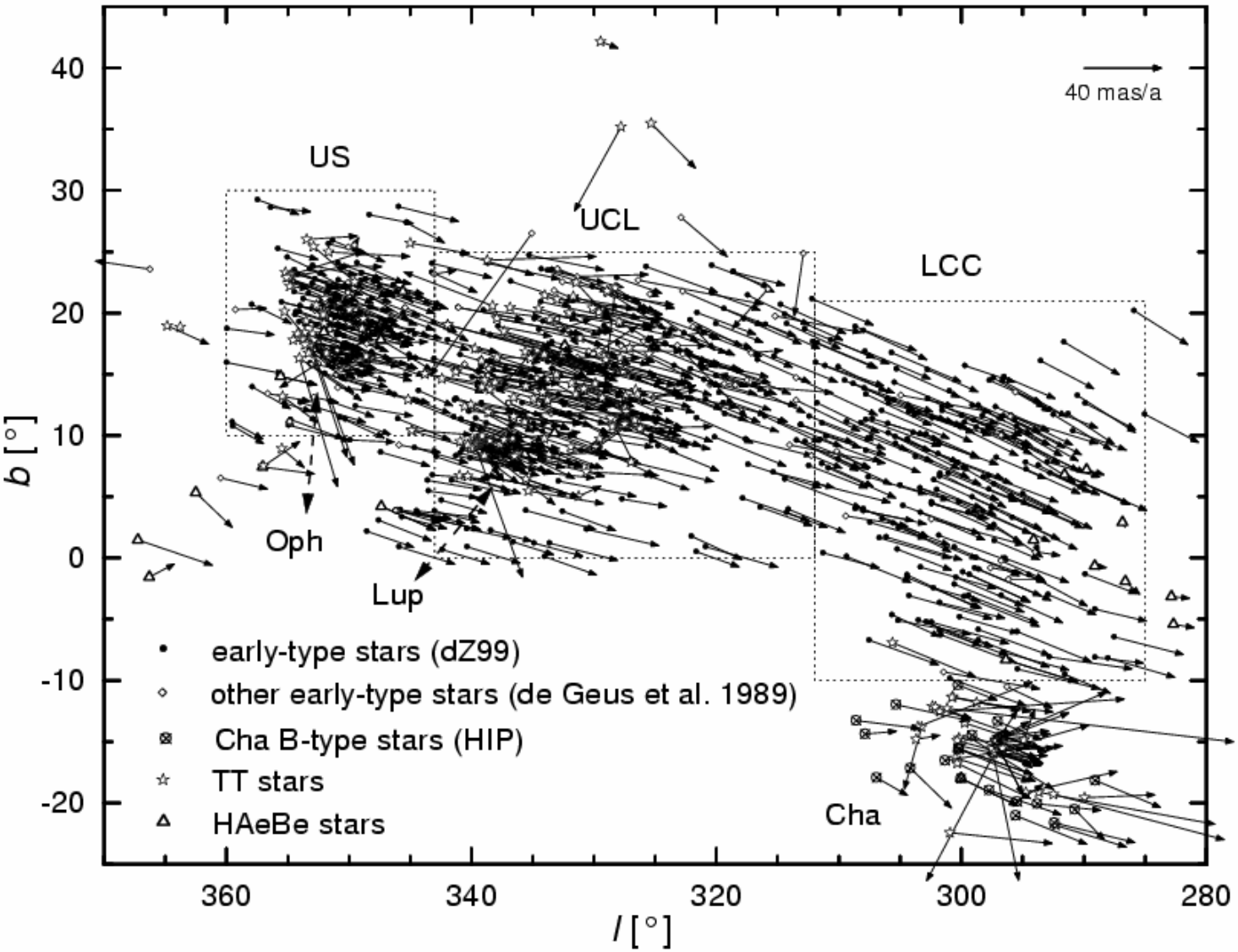
incorrect like many others

The main differences between our model of the formation of the OMC and that of Franco et al. are the following: 1) we consider that the HVC arrived from the northern side of the Galaxy, and that we are observing a primary collision. An argument in favor of our view is that a collision strongly distorts the gas distribution, so that in a secondary collision the incident gas cannot be regarded as having a simple geometry. In the case of a secondary collision we would expect to observe clusters of stars formed in the first collision, as discussed later in the case of the

would not be surprising to find cloud complexes looking like cylinders with a hole at their top, because the gas of the center of the shocked layer can dissipate sooner than at other places. Such structures, seen almost edge-on, might look like a ring of smoke. We argue later in this work that this is the case for the Taurus-Auriga-Perseus complex.

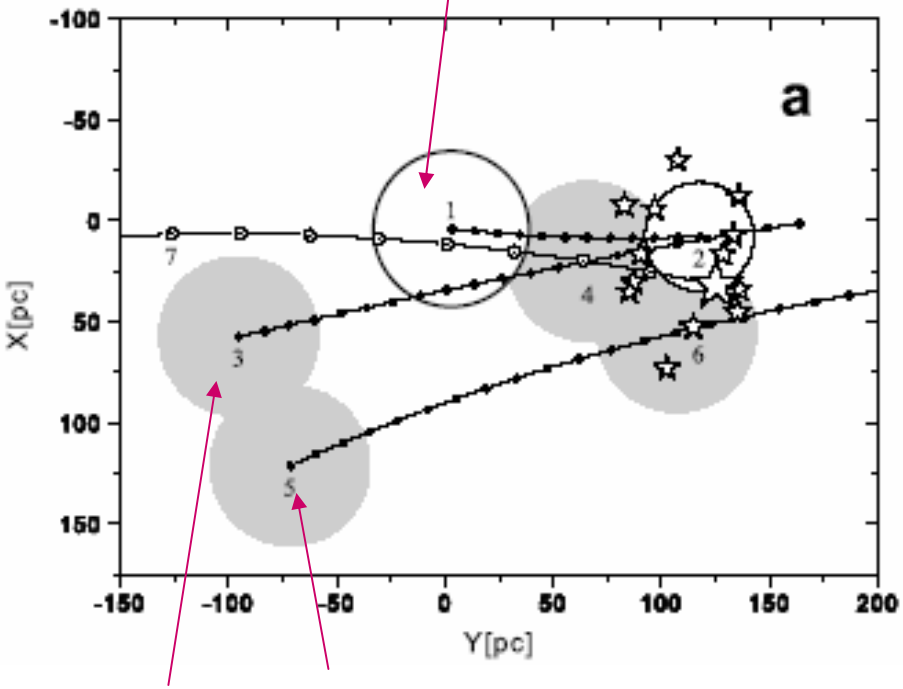
3.2. *The ρOph region*

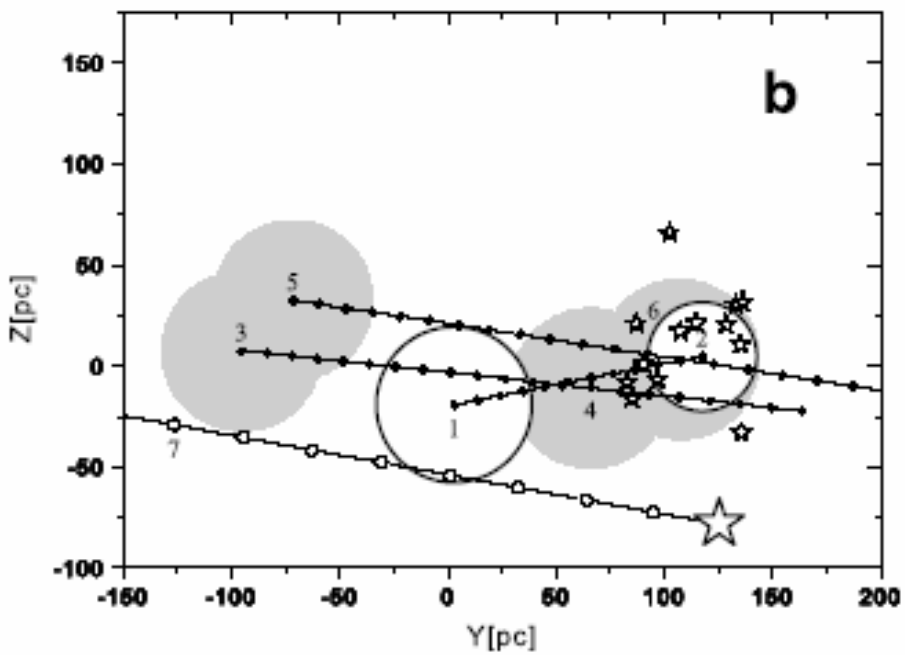
The filamentary complex of dark clouds in Ophiuchus extend over a region of about 15° by 15°. While the first CO and star-counts studies concentrated on the ρOph cloud, which is the densest core in the westernmost part of the complex, maps of the whole region are now available, including the northern filaments



Sartori, Lépine, Dias

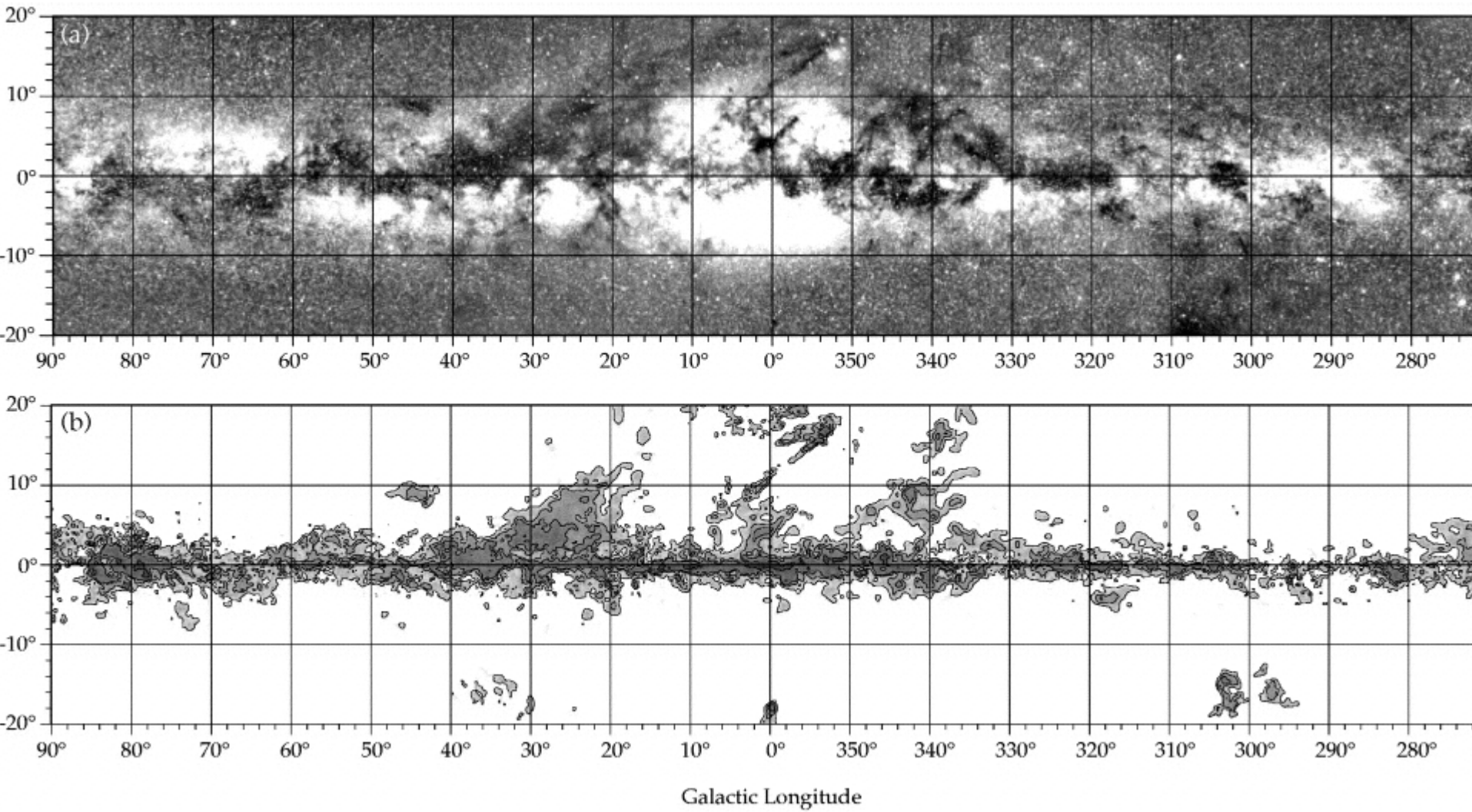
Beta Pictoris moving group





LCC UCL

Ortega, de la Reza, Jilinski, and B. Bazzanella (2004) : the groups shown were close together some 13 My ago . They interpret in terms of supernova explosion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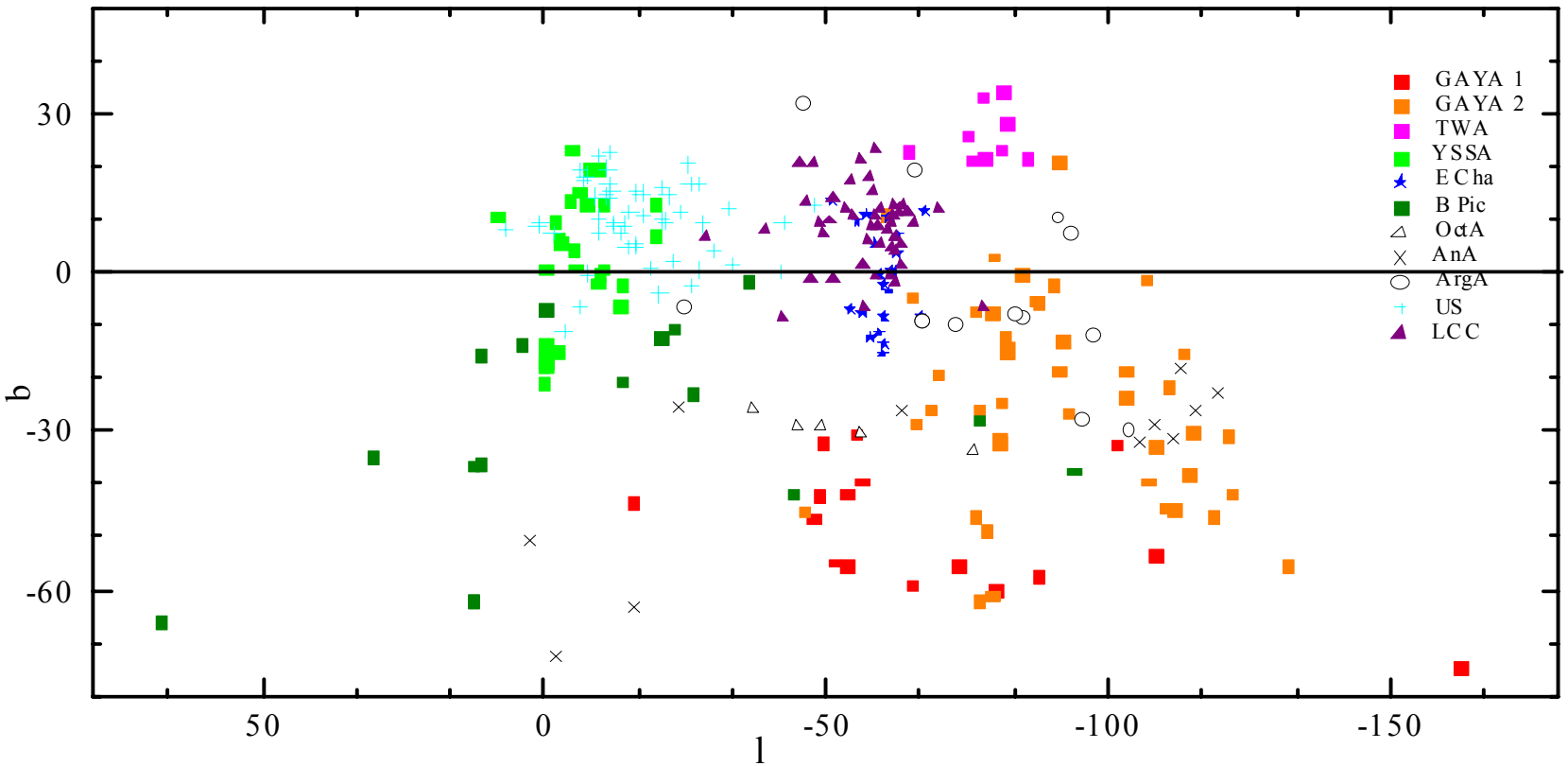
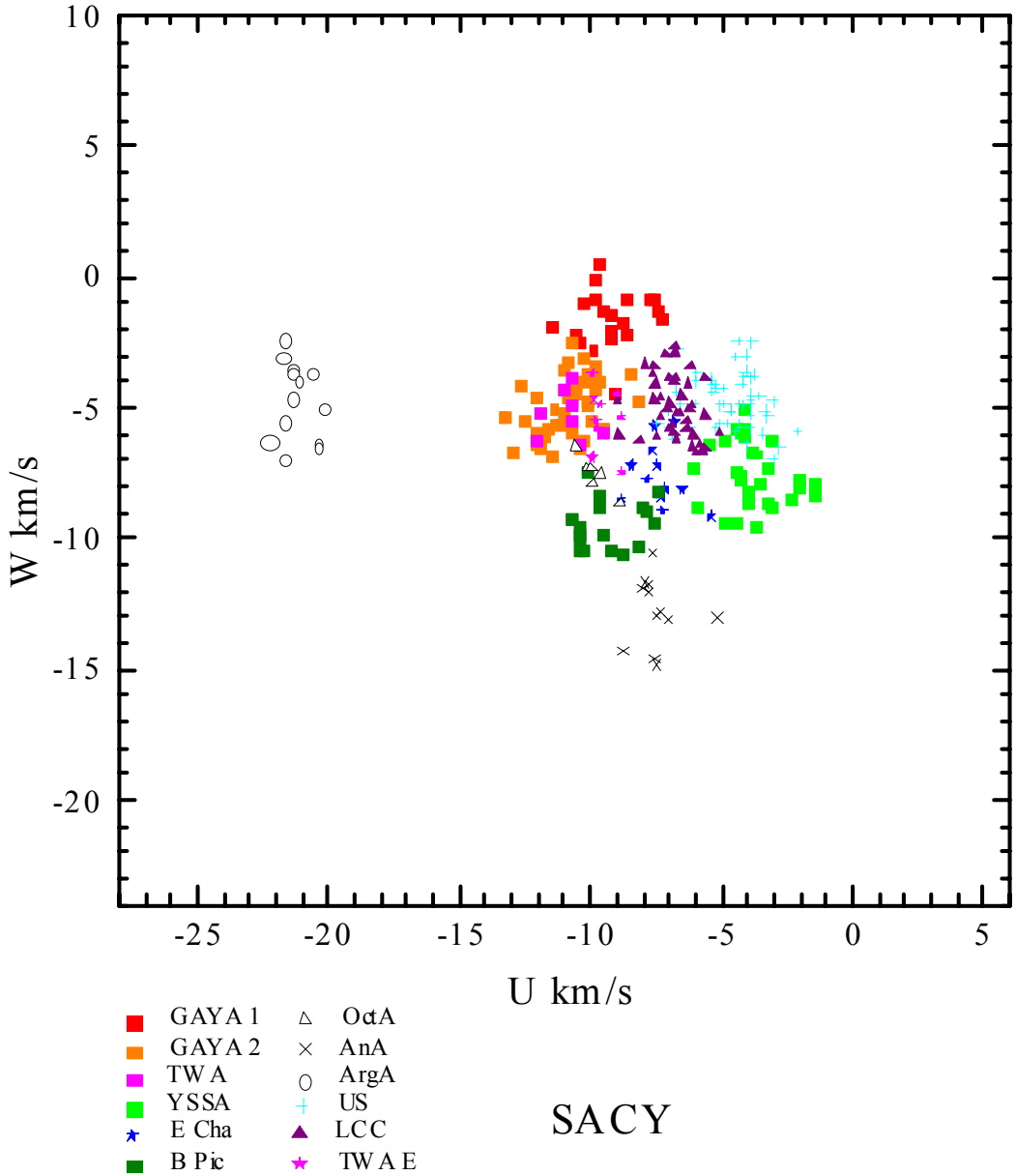
Galactic Longitude

Torres and collaborators are identifying many moving groups of young stars

start from ROSAT list of X-ray candidates, use Tycho proper motions, and precise radial velocities obtained with FEROS spectrograph
select young stars based on Li line

6- dimensional analysis : X, Y, Z, U, V, W

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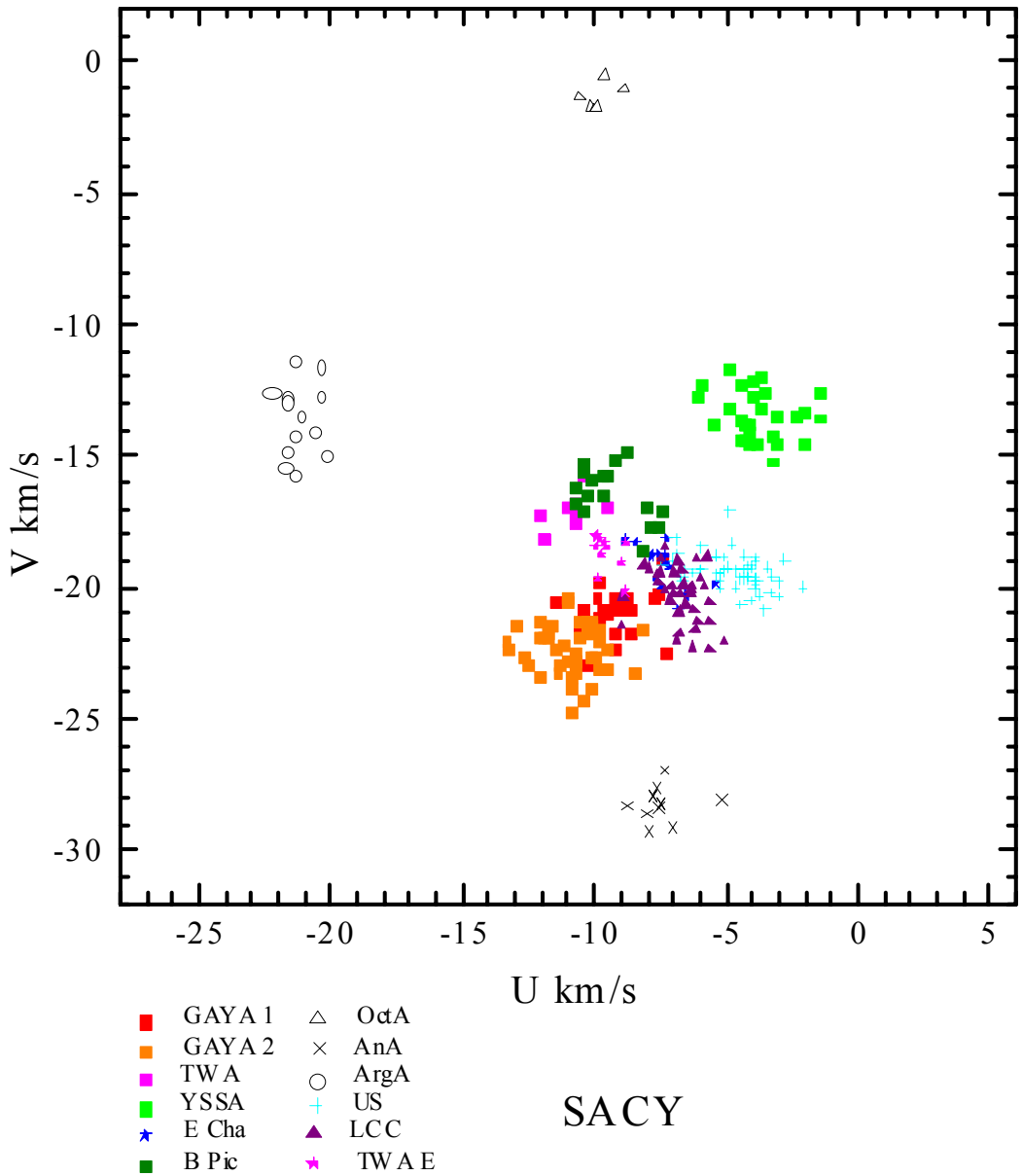
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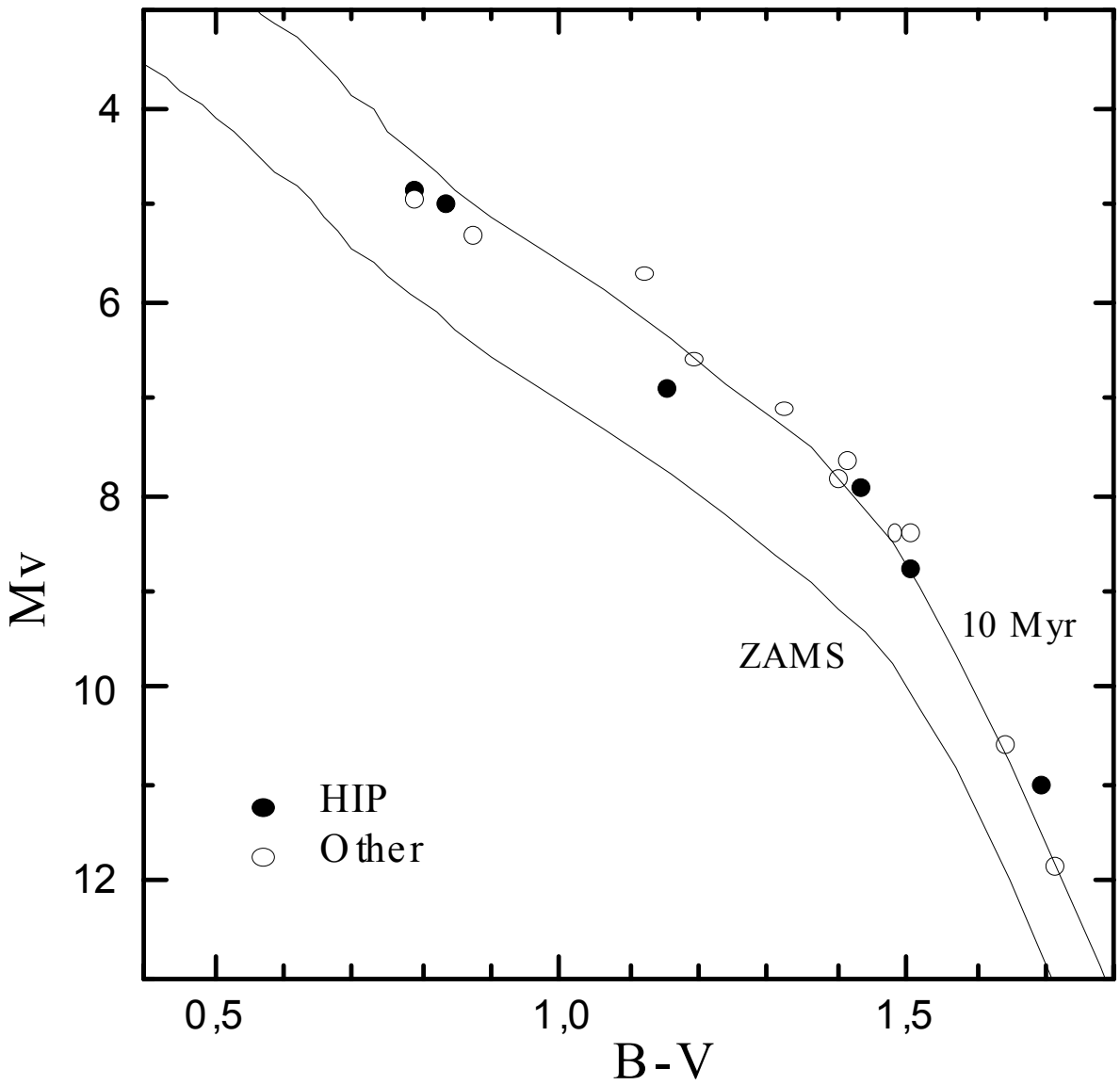


B Pic

Useful results for COROT

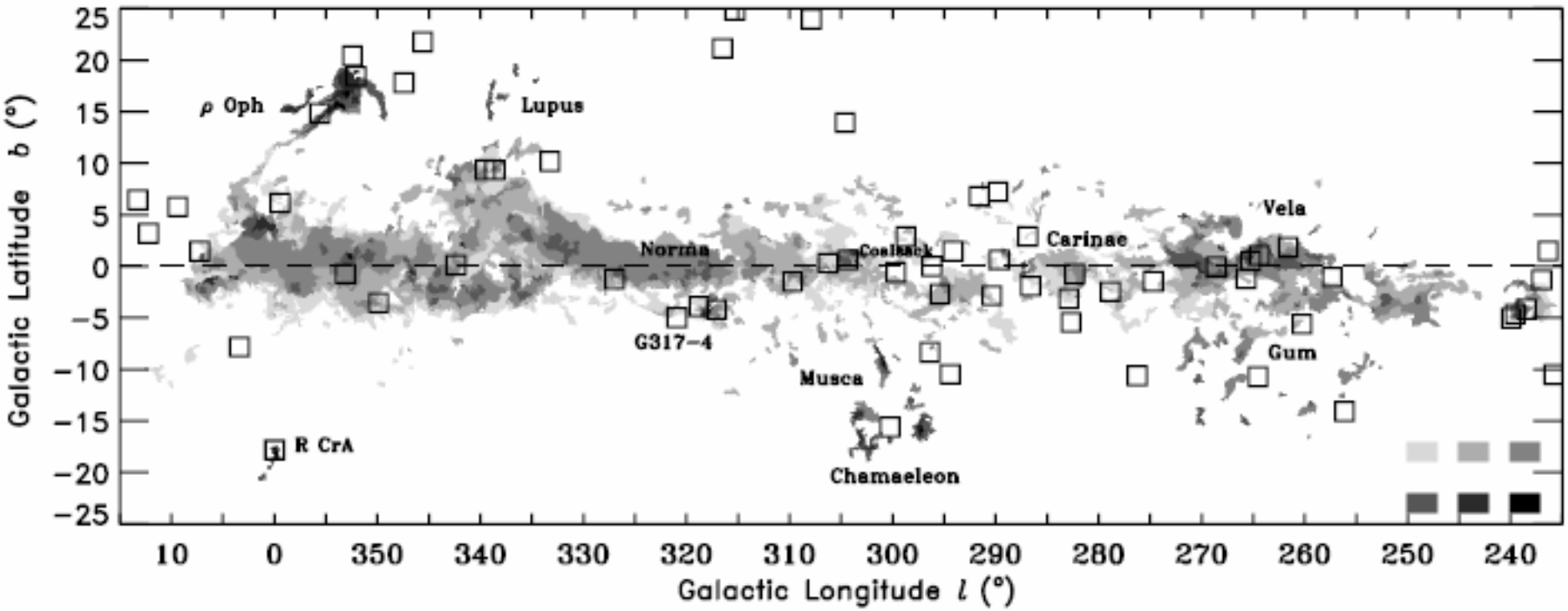
• every young star belongs to a moving group or association.

• when PMS targets are selected, we can identify to which moving it belongs, and provide precise age determination . Better understanding of variability type.

INVESTIGATION OF 131 HERBIG Ae/Be CANDIDATE STARS[1]

S. L. A. VIEIRA,[2] W. J. B. CORRADI,[2] S. H. P. ALENCAR,[2,3] L. T. S. MENDES,[2]
C. A. O. TORRES,[4] G. R. QUAST,[4] M. M. GUIMARÃES,[2] AND L. DA SILVA[5]

Received 2002 August 19; accepted 2003 August 29

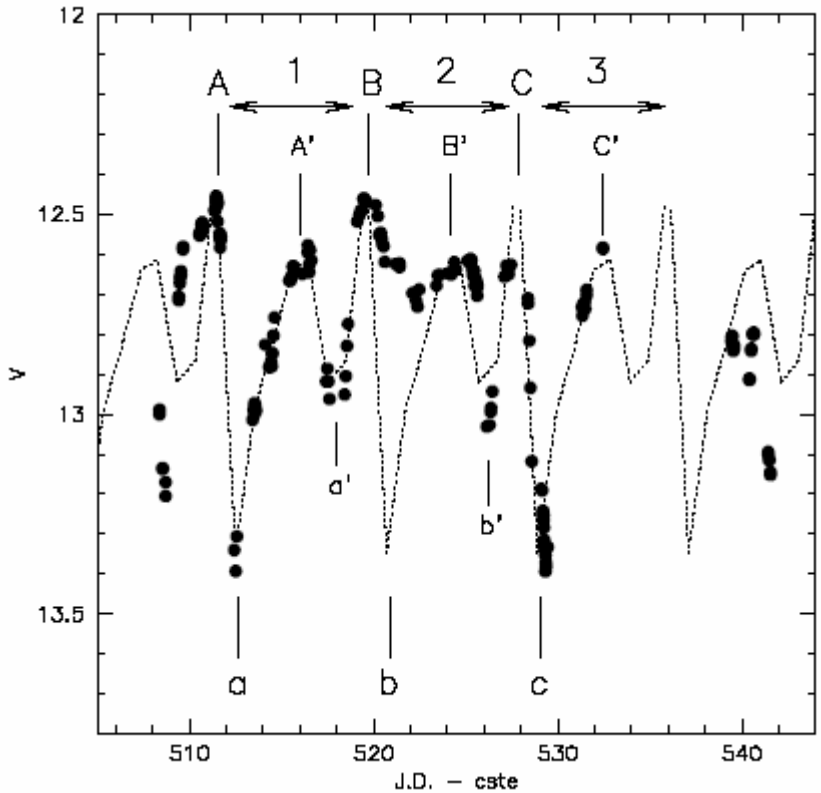


Eclipses by circumstellar material in the T Tauri star AA Tau

II. Evidence for non-stationary magnetospheric accretion⋆

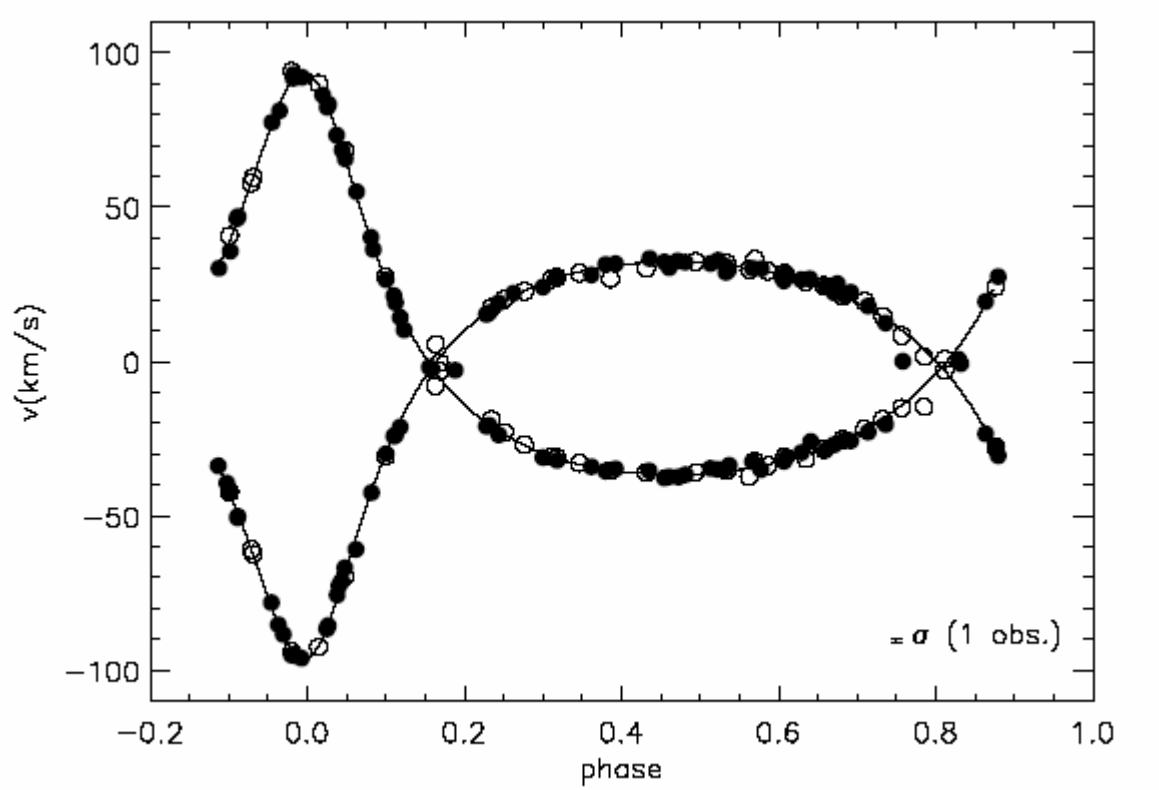
J. Bouvier[1], K. N. Grankin[2], S. H. P. Alencar[3], C. Dougados[1], M. Fernández[4], G. Basri[5], C. Batalha[6], E. Guenther[7], M. A. Ibrahimov[2], T. Y. Magakian[8], S. Y. Melnikov[2], P. P. Petrov[9], M. V. Rud[10], and M. R. Zapatero Osorio[11]

variability of AA Tau is interpreted as occultation of the stellar photosphere by circumstellar material orbiting the star at keplerian velocity.



The pre-main sequence spectroscopic binary AK Scorpii revisited⋆,⋆⋆

S. H. P. Alencar[1,6], C. H. F. Melo[2], C. P. Dullemond[3], J. Andersen[4], C. Batalha[5], L. P. R. Vaz[1], and R. D. Mathieu[7]



VARIABILITY OF SOUTHERN T TAURI STARS. II. THE SPECTRAL VARIABILITY OF THE CLASSICAL T TAURI STAR TW HYDRAE[1]

SILVIA H. P. ALENCAR[2] AND CELSO BATALHA[3]

Received 2001 October 16; accepted 2002 January 28

They found periodic variability in the veiling, line profile intensities. It seems that accretion and outflow are related. Blue Halpha absorption is more intense when accretion rate is larger.

International Colloquium on Star Formation in Minas Gerais State

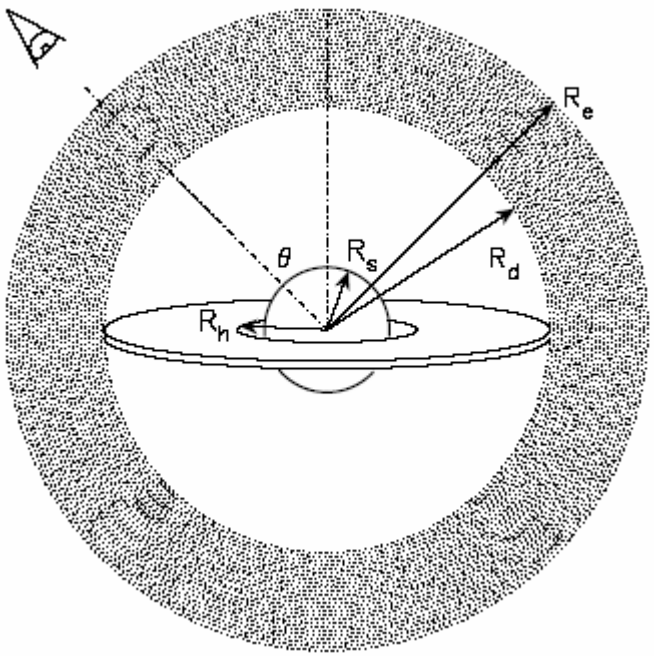
Ouro Preto, Brazil

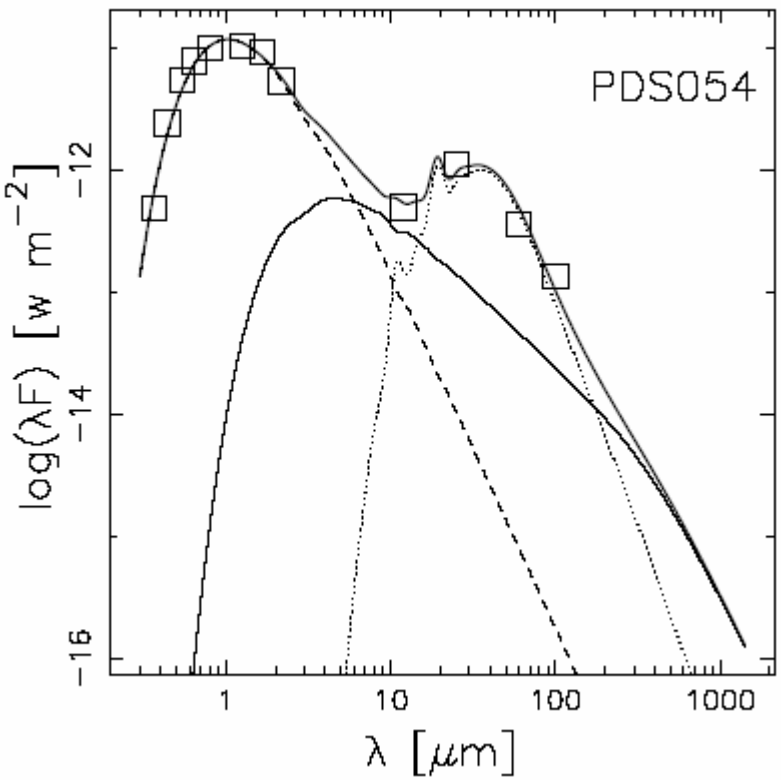
April 5-10, 2003

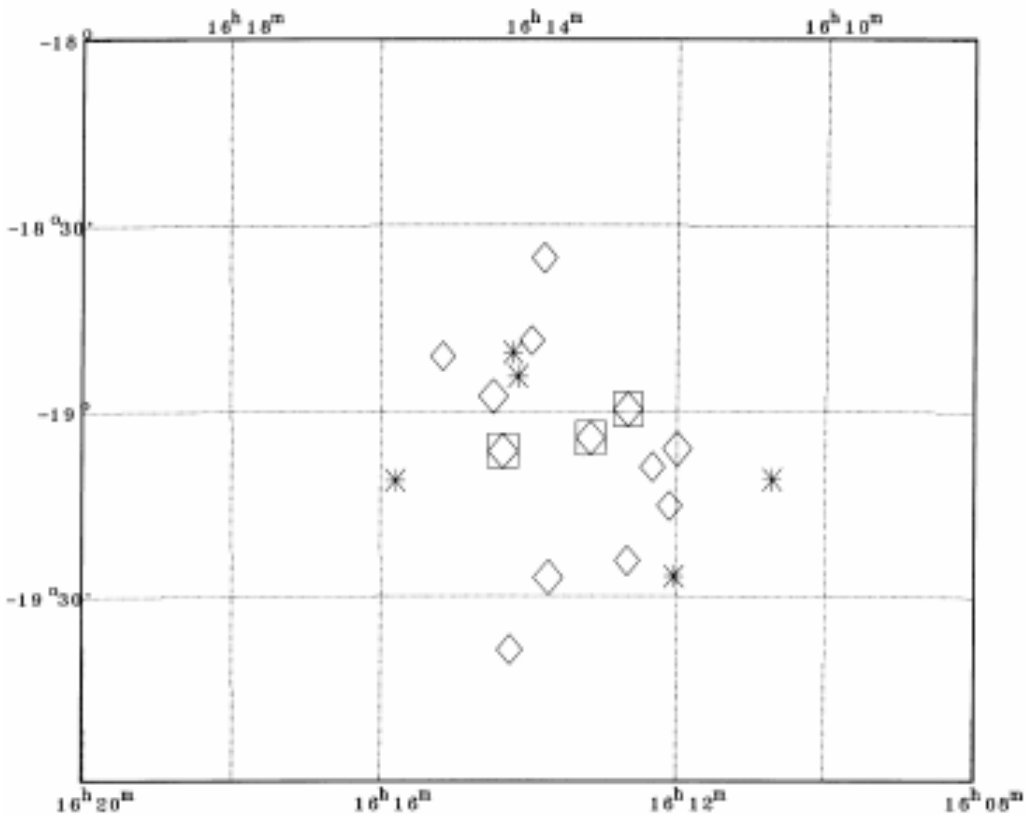
Mon. Not. R. Astron. Soc. 336, 197–206 (2002)

Classification of a selected sample of weak T Tauri stars

J. Gregorio-Hetem[1⋆] and A. Hetem, Jr[2⋆]





Spectroscopic classification of X-ray selected stars in the ρ Ophiuchi star-forming region and vicinity

E. L. Martín,[1,2] T. Montmerle,[3] J. Gregorio-Hetem[4] and S. Casanova[3]