Hungarian science with ESO instrumentation

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Successful observing proposals (2009 – 2015)

La Silla Paranal Observatory (open time, DDT, GTO):

- As PI: 18 (CRIRES, NACO, MIDI, VISIR, SINFONI, ISAAC, FEROS, FORS2, SPHERE)
- As Co-I: 10 (CRIRES, NACO, MIDI, VISIR, SINFONI, HARPS)
- Success rate: ~50%

ALMA and APEX proposals:

10 (in Cycles 0 – 3)

The 2008 outburst of EX Lup

Goto et al. 2011, Juhász et al. 2012, Kóspál et al. 2013, 2015, Sicilia-Aguilar 2015

Optical imaging: 2.2m/WFI+GROND

Optical spectroscopy: 2.2m/FEROS

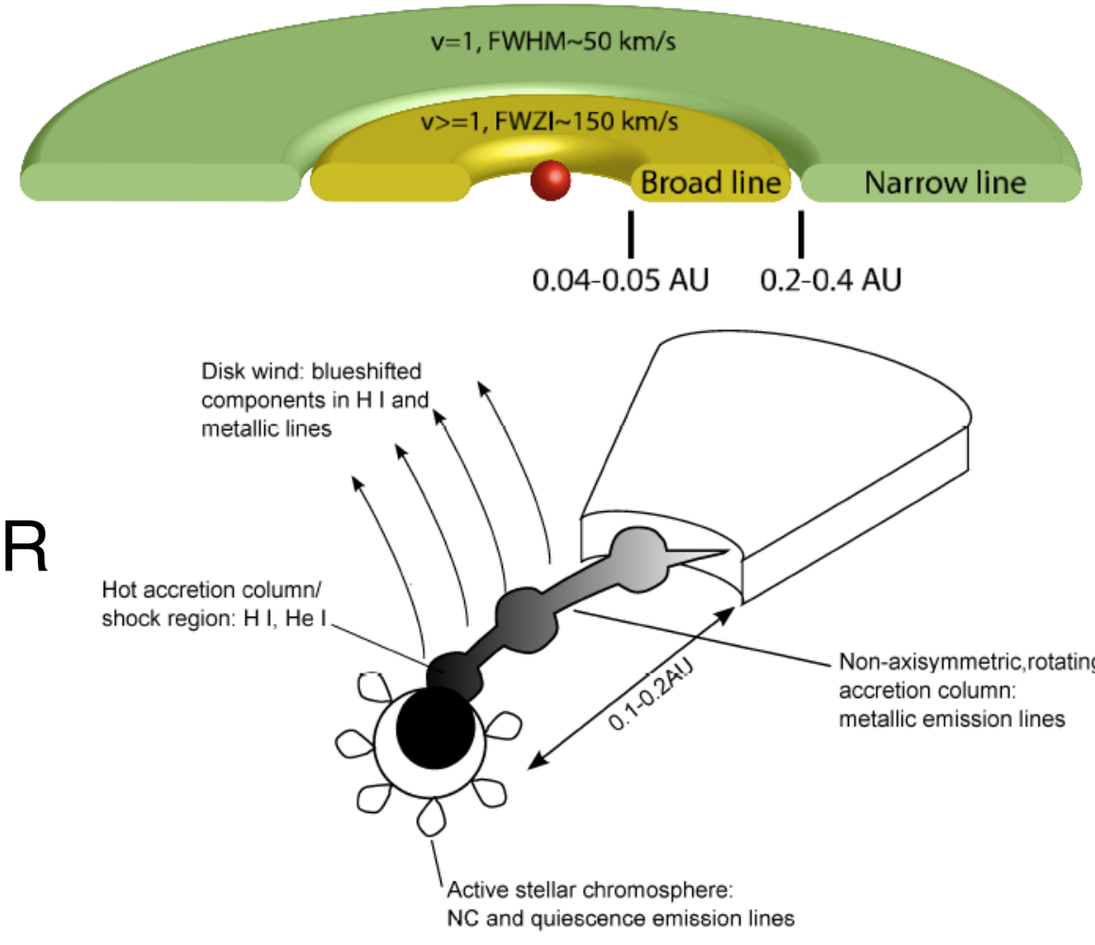
Near-IR imaging: NTT/SOFI

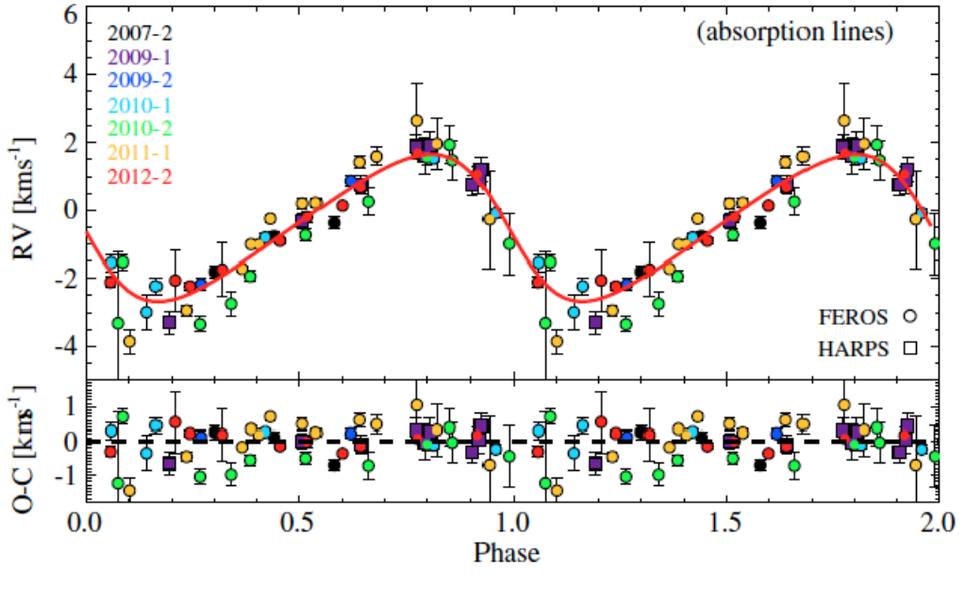
Near-IR spectroscopy: VLT/SINFONI

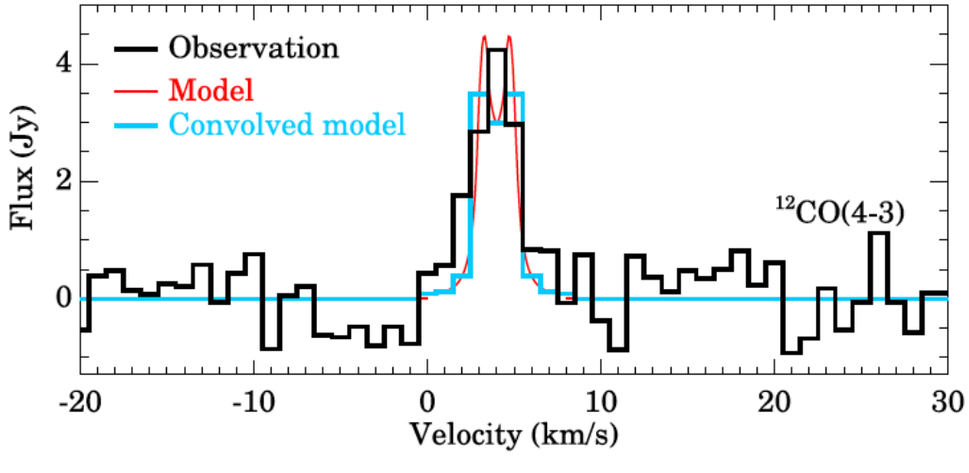
Mid-IR spectroscopy: VLT/CRIRES+VISIR

Mid-IR interferometry: VLT/MIDI

Millimeter continuum+CO: APEX







Detection of Hale-Bopp at 32 au

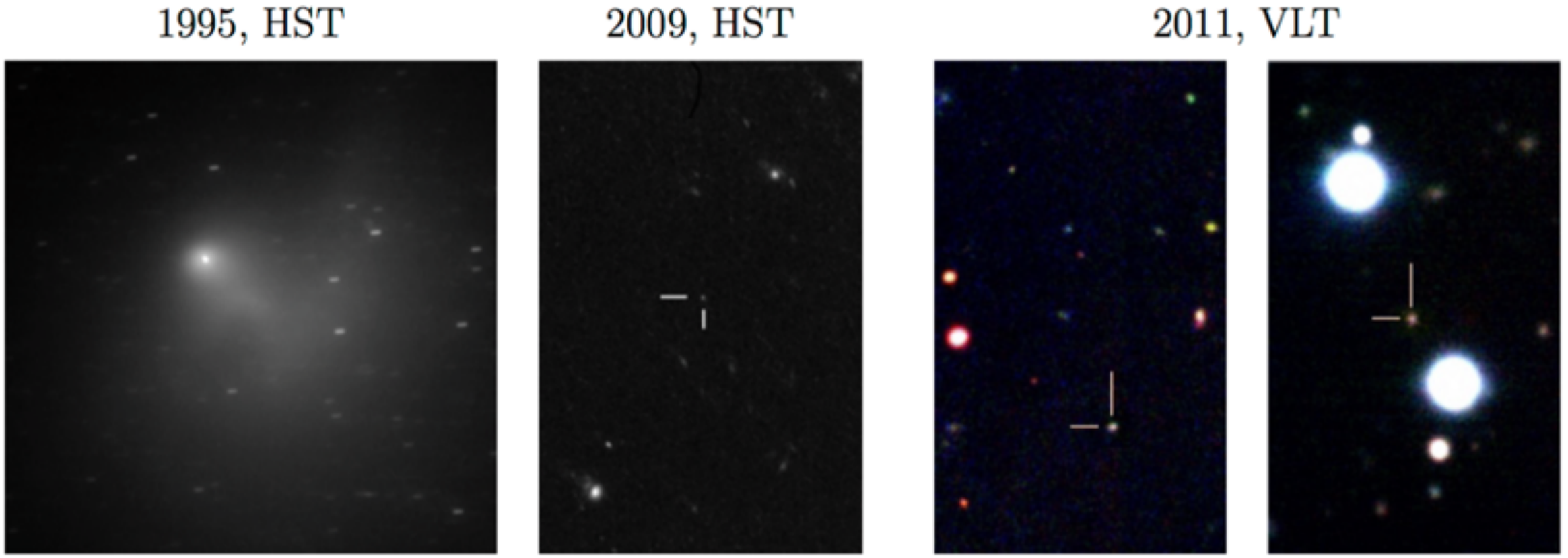
Szabó, Gy. et al. (2012), ApJ, 761, 8

Perihelion: April 1, 1997

VLT/FORS imaging of the comet in inactive phase

Significantly higher albedo than pre-perihelion value

Evidence for fresh frost layer on the bare nucleus



ALMA observations of the first hybrid disk

Kóspál et al. (2013) ApJ, 776, 77, Moór et al. (2013) ApJL 777, L25

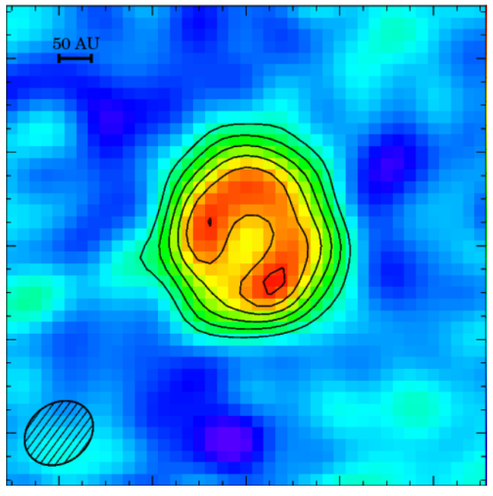
Debris dust disk around a 30 Myr old A3 star (HD 21997)

APEX discovery of CO gas + ALMA discovery of ^{13}CO and C^{18}O gas

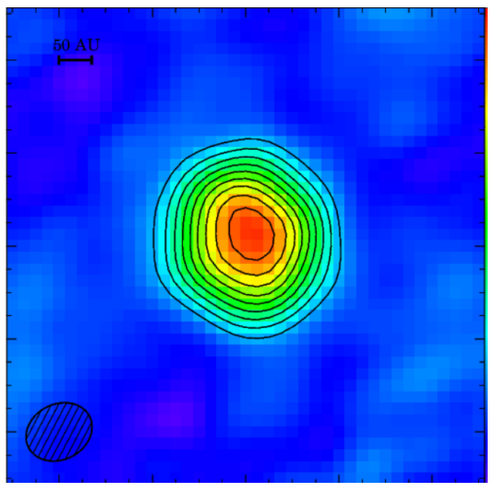
First hybrid disk: secondary dust + primordial gas

New paradigm for massive disk evolution around A-type stars?

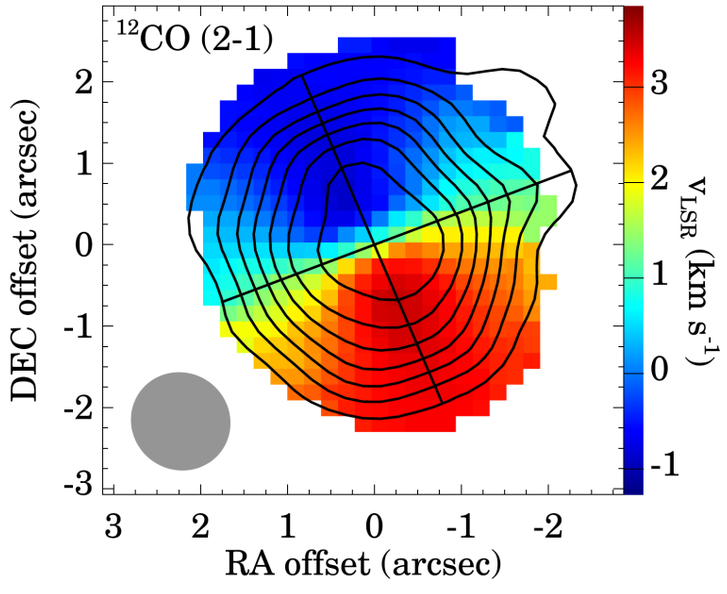
880 μm dust continuum



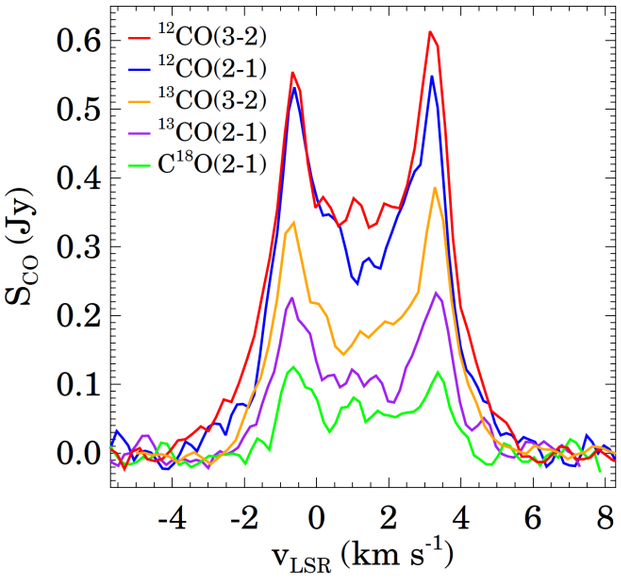
^{12}CO(2-1) gas line



CO gas velocity field



integrated line profiles



Discovery of new moving group members

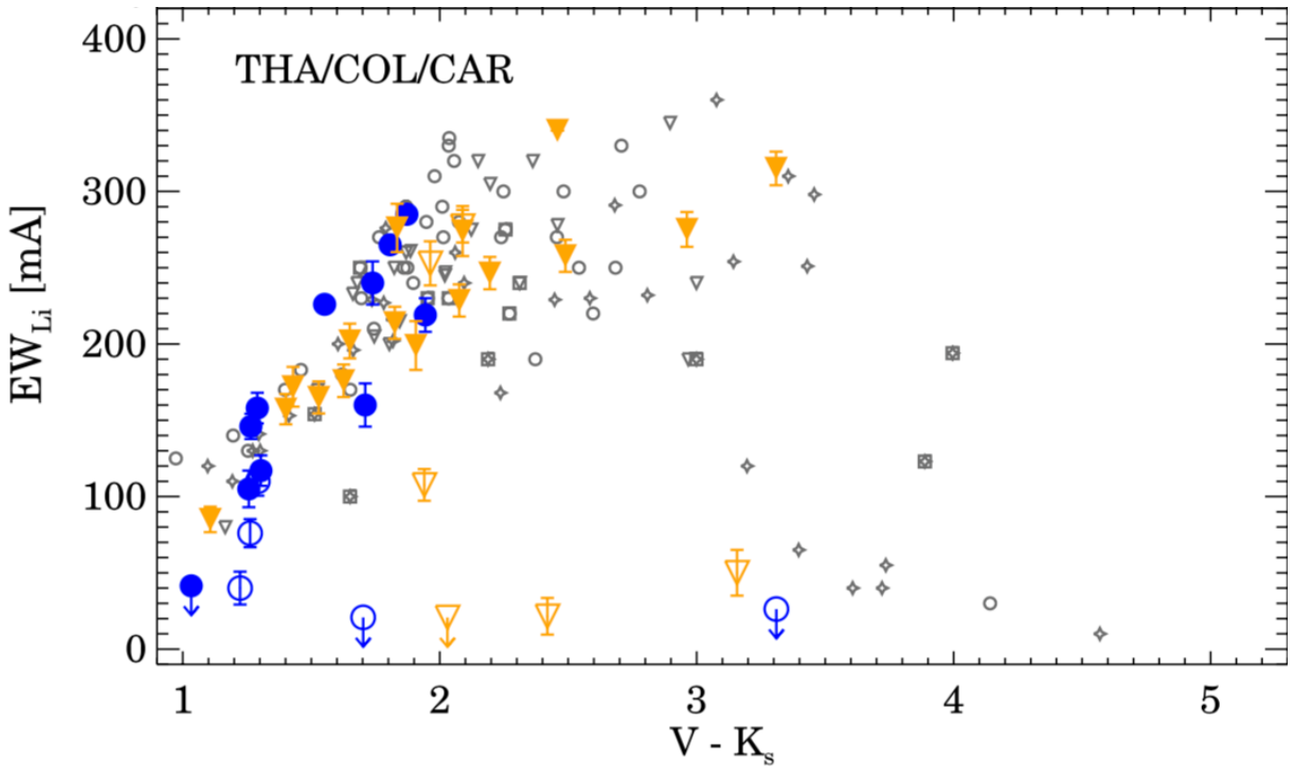
Moór et al. (2013) MNRAS, 435, 1376

Astrometric information + new 2.2m/FEROS spectra → 3D galactic velocity

Identification of 35 new probable members of 5 young nearby moving groups, mostly Sun-like (10% increase!)

Youth of new members verified with Li abundance

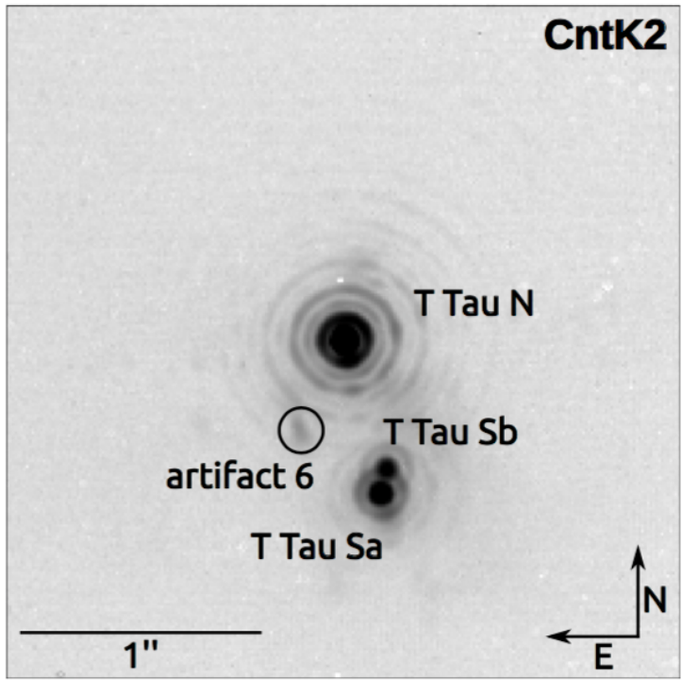
Promising targets for planet search



Lithium equivalent width from FEROS

Examining the T Tauri system with SPHERE

Csépány et al. (2015) A&A Letters, 578, L9

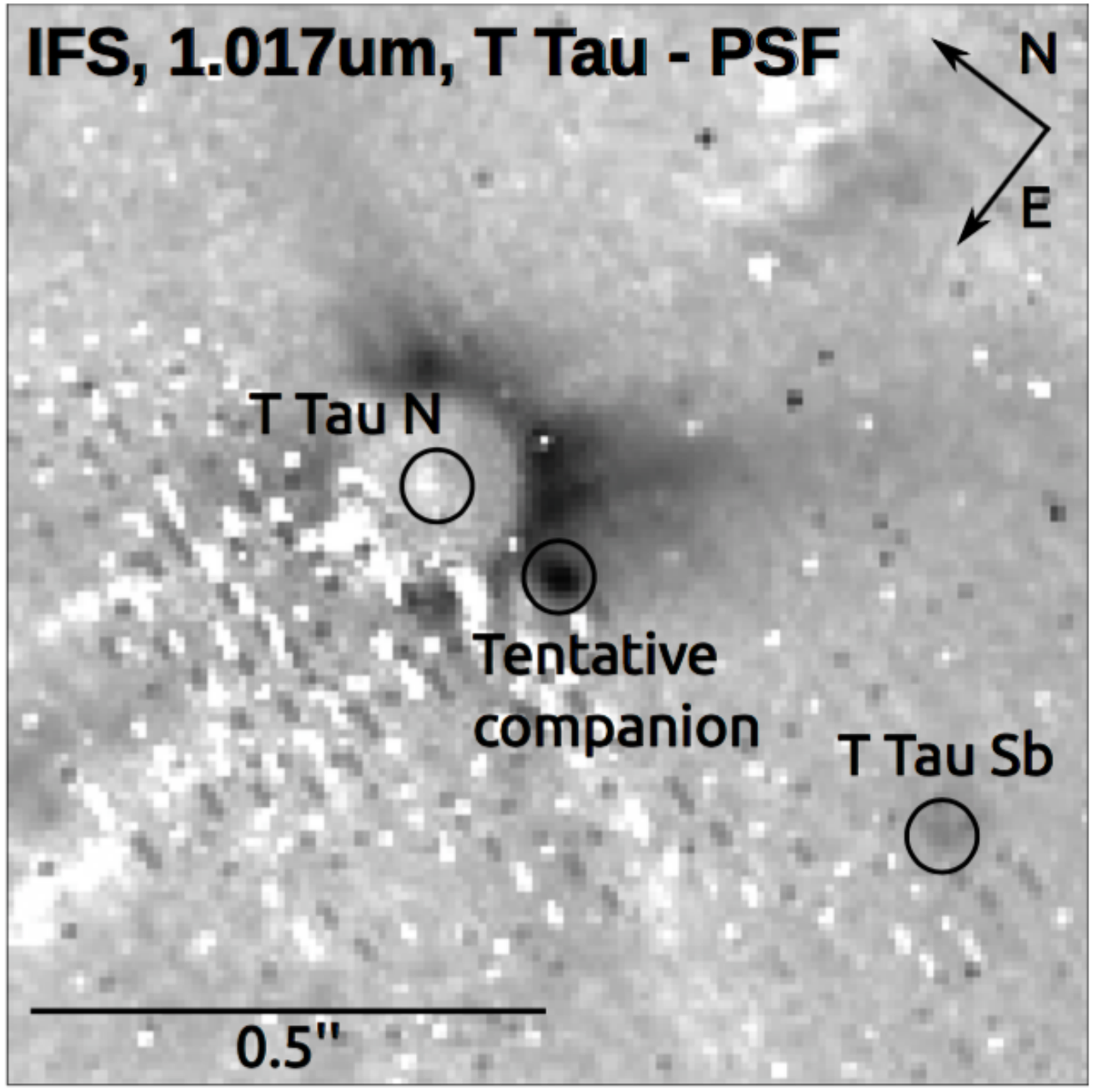


Science verification proposal

All 3 known components are clearly resolved

A tentative new component is discovered

Orbital elements are refined



The earliest phases of massive star formation

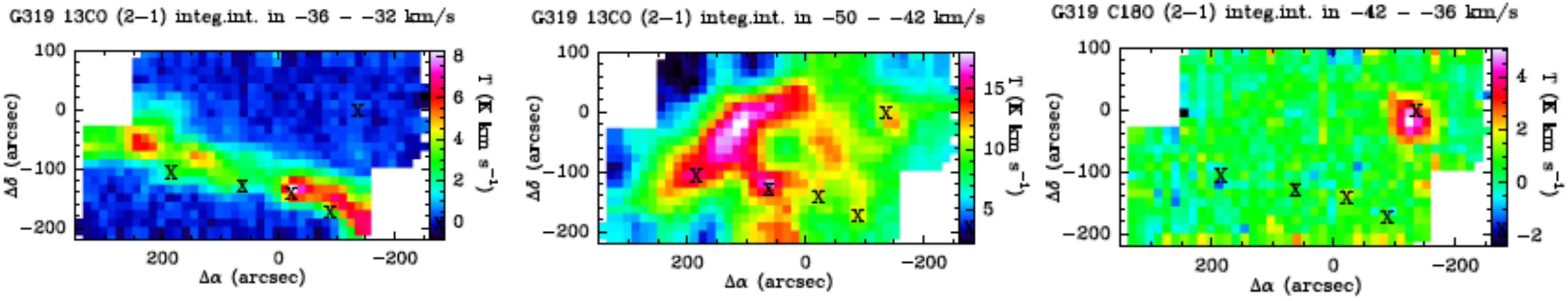
Zahorecz et al. (2016) A&A in press, arXiv:1603.04102

Physical properties of a homogeneous galactic cold core sample obtained with the Planck satellite across the Galactic Plane

APEX/SHFI observations of ^{13}CO, $C^{18}O$ and N_2H^+ for Planck cold clumps

Revealed different velocity coherent structures in the line of sight

Used to determine kinematical distances



Three velocity components observed in G319.35+00.87

The spectroscopic binary nature of six Cepheids

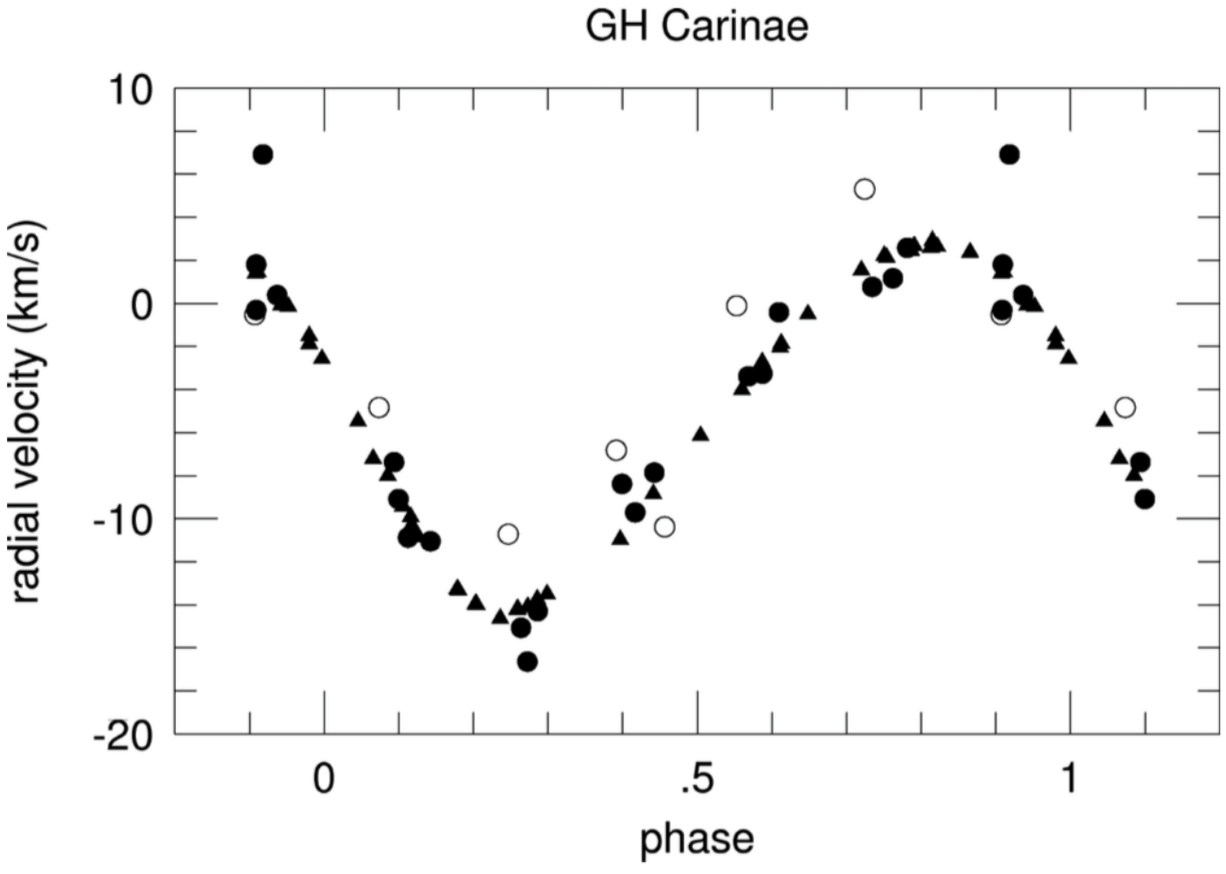
Szabados et al. (2013) MNRAS, 430, 2018

Observations with 2.2m/FEROS

Six well-known bright southern Cepheids were found to be spectroscopic binaries

Confirmed the high frequency of binaries among the classical Cepheids

Affects the calibration of the period-luminosity relationship for Cepheids



Radial velocity curve from FEROS

The Lendület (Momentum) program

- Started in 2009 by the **Hungarian Academy of Sciences**
- **Aim:** dynamic renewal of the research teams at the academic science institutes and universities
- **Way:** attracting outstanding young researchers back to Hungary or halt their emigration
- **Result:** more than 100 funded research groups in various fields (life sciences, mathematics and natural sciences, social sciences)

The Disk Research Group

- Winner of the Momentum program in 2014
- Program duration: 2014 October – 2019 September
- Host institute: Konkoly Observatory
- Total budget: 620 000 EUR
- PI: Ágnes Kóspál

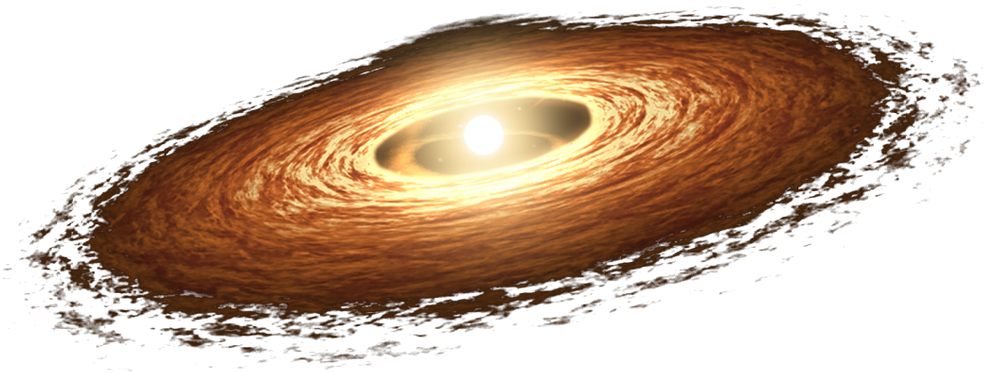
The Disk Research Group

Group members:

- 4 postdocs (L. Chen, O. Fehér, A. Moór, Zs. Regály)
- 1 PhD student (G. Csépány, co-supervised by ESO)
- 2 master students (Z. Dencs, A. Németh)
- 5 part-time local collaborators (P. Ábrahám, M. Kun, Gy. Mező, A. Pál, E. Szegedi-Elek)
- 1 administrative assistant (E. Hernold)

Dynamics of circumstellar disks: Star and planet formation in the ALMA era

- **Our aim:** understand the formation of Sun-like stars and their exoplanetary systems by studying the physics and evolution of circumstellar disks



- **Immediate questions:**
  - Is episodic accretion sufficient to explain the formation of Sun-like stars?
  - How does the large- and small-scale disk dynamics influence planet formation?
  - How long can gas and dust survive during disk evolution enabling the formation of gas giant planets?