



The GPI Exoplanet Survey II: Atmospheres and Orbits of Substellar Companions to Young and Nearby stars

Julien Rameau (iREx, U. de Montréal) 
on behalf of the GPIES Consortium

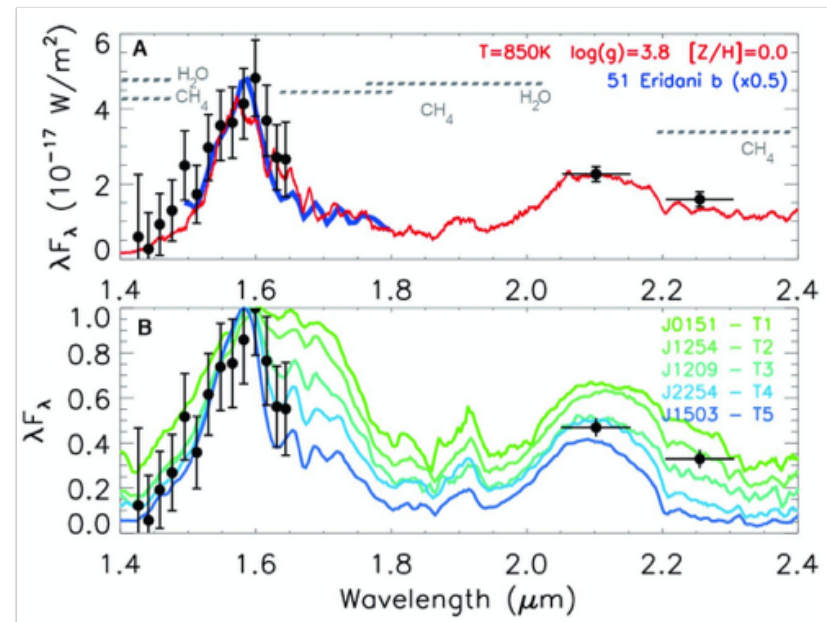
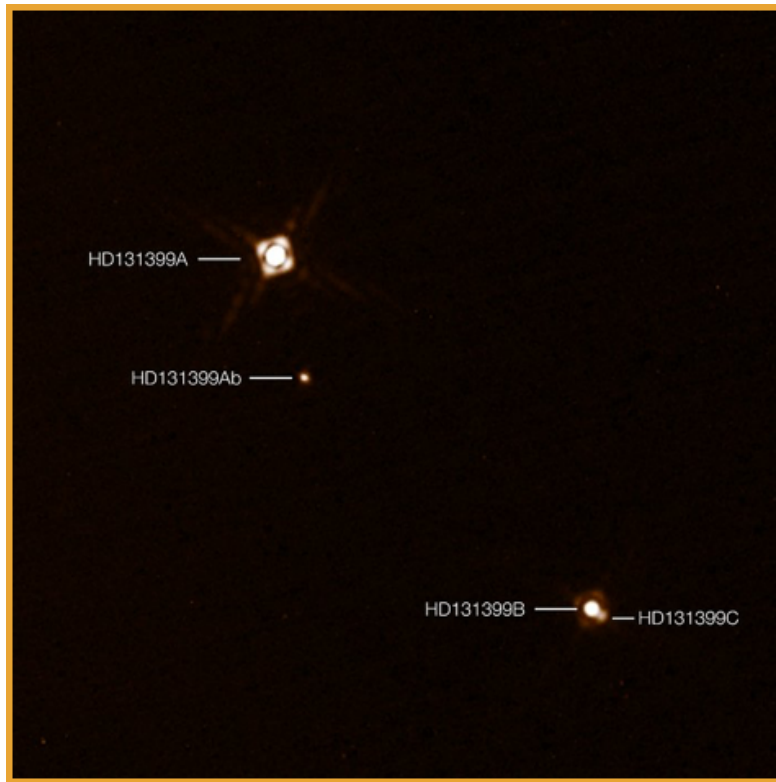
Jonathan Aguilar, S. Mark Ammons, Pauline Arriaga, Etienne Artigau, Travis Barman, Steve Beckwith, James Brewster, Sebastian Bruzzone, Joanna Bulger, Ben Burningham, Adam S. Burrows, Christine Chen, Eugene Chiang, Jeffrey K. Chilcote, Rebekah I. Dawson, Robert J. De Rosa, Ruobing Dong, René Doyon, Zachary H. Draper, Gaspard Duchêne, Thomas M. Esposito, Daniel Fabrycky, Michael P. Fitzgerald, Katherine B. Follette, Jonathan J. Fortney, Benjamin Gerard, James R. Graham, Alexandra Z. Greenbaum, Pascale Hibon, Sasha Hinkley, Justin Hom, Tara Hufford, Li-Wei Hung, Patrick Ingraham, Rebecca Jensen-Clem, Mara Johnson-Groh, Paul Kalas, Quinn Konopacky, David Lafreniere, James E. Larkin, Samantha Lawler, Eve Lee, Jinhee Lee, Michael Line, Douglas Long, Bruce Macintosh, Jerome Maire, Franck Marchis, Mark S. Marley, Christian Marois, Brenda C. Matthews, Stanimir Metchev, Max Millar-Blanchaer, Caroline V. Morley, Katie M. Morzinski, Ruth Murray-Clay, Eric L. Nielsen, Rebecca Oppenheimer, David W. Palmer, Rahul Patel, Jenny Patience, Marshall D. Perrin, Lisa A. Poyneer, Laurent Pueyo, Roman R. Rafikov, Abhijith Rajan, Julien Rameau, Fredrik T. Rantakyro, Emily Rice, Malena Rice, Patricio Rojo, Jean-Baptiste Ruffio, M. T. Ruiz, Maissa Salama, Didier Saumon, Dmitry Savransky, Adam C. Schneider, Anand Sivaramakrishnan, Inseok Song, Rémi Soummer, Sandrine Thomas, Gautam Vasisht, J. Kent Wallace, Jason J. Wang, Kimberly Ward-Duong, Sloane J. Wiktorowicz, Schuyler G. Wolff, Joe Zalesky, Ben Zuckerman





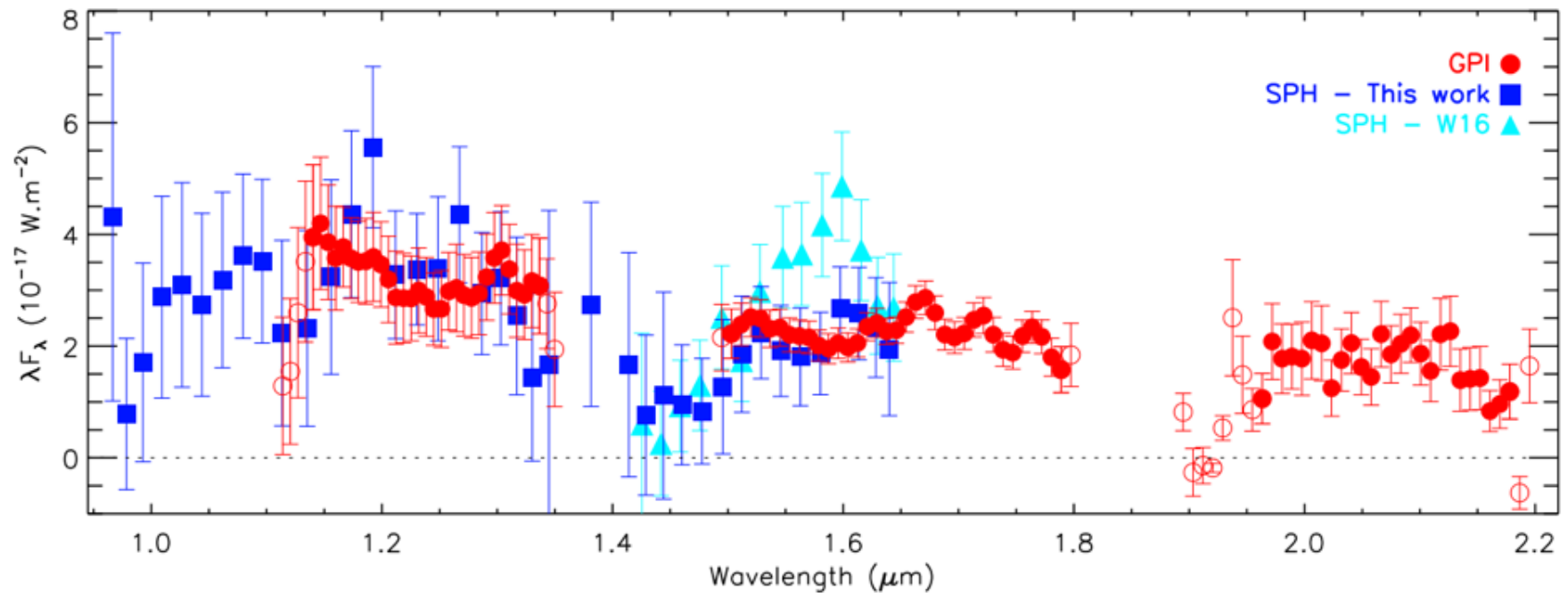
Assessing the status of a planet

HD 131399 Ab?



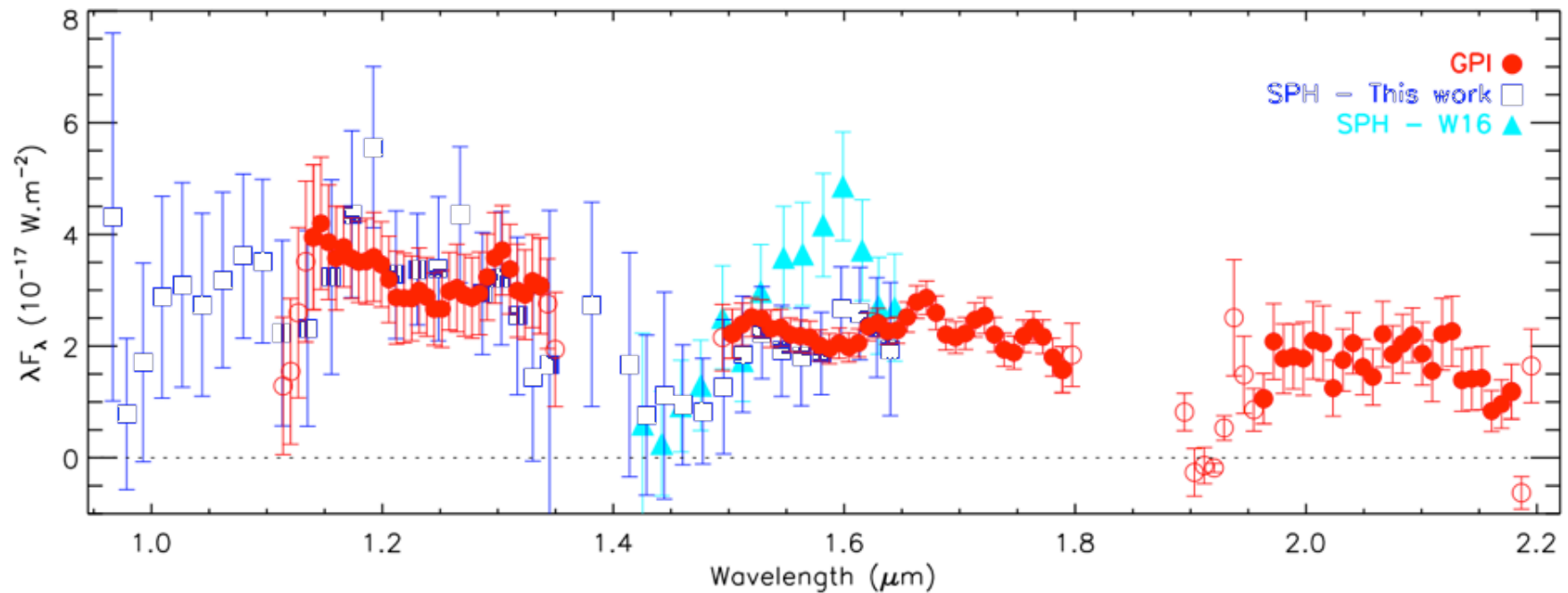
HD 131399 Ab?

A revised flat spectrum of a K or M object

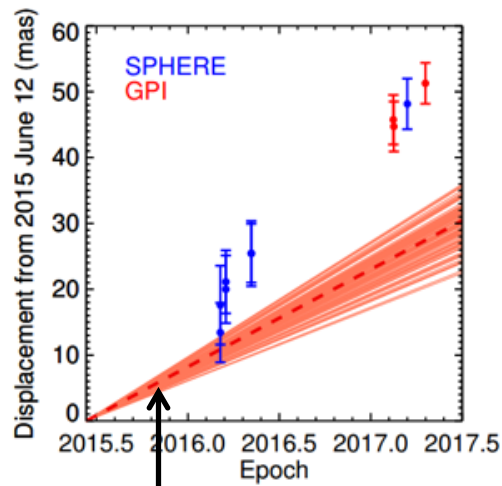


HD 131399 Ab?

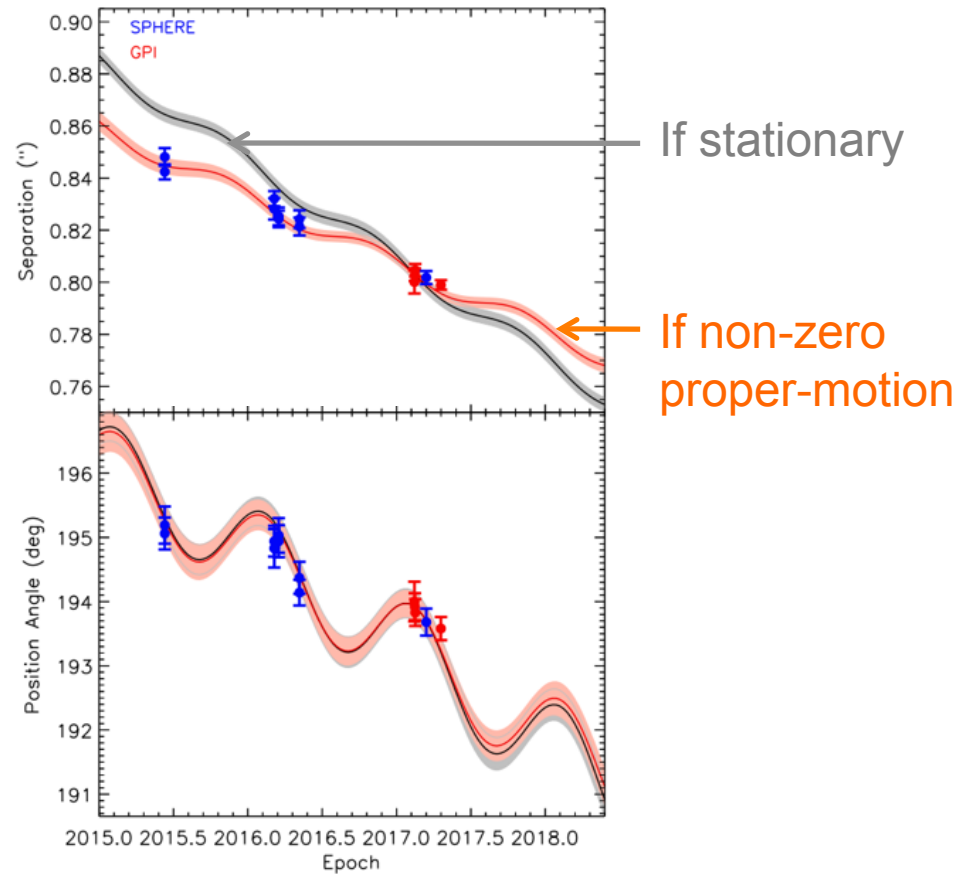
A revised flat spectrum of a K or M object



HD 131399 Ab is a background object



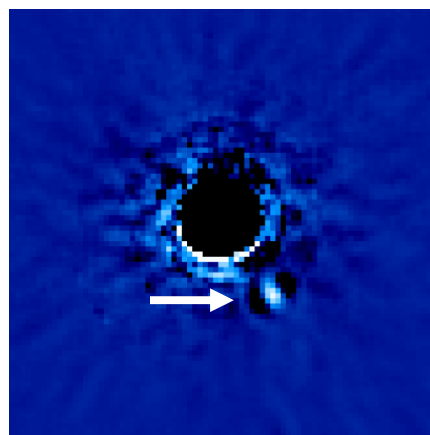
Displacement
at escape velocity



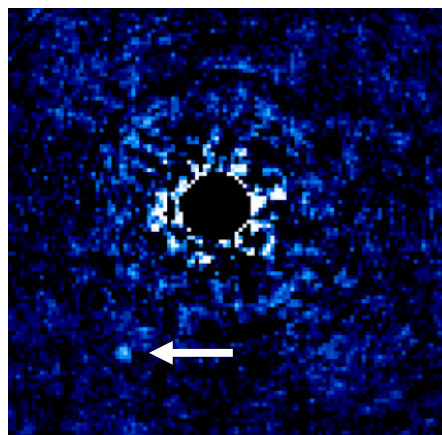


Back on the detections

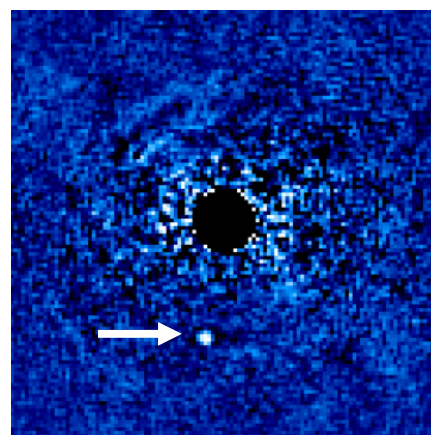
The GPIES Haul



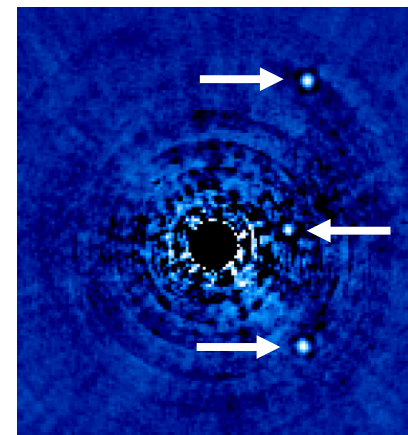
β Pic b



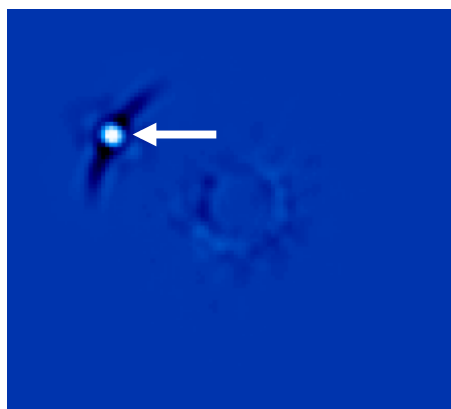
HD 95086 b



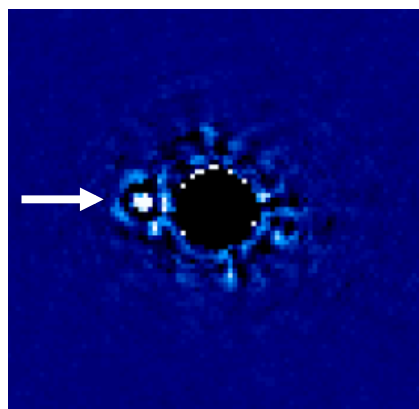
51 Eri b



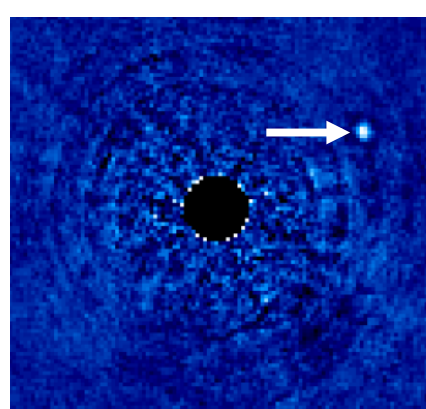
HR 8799 cde



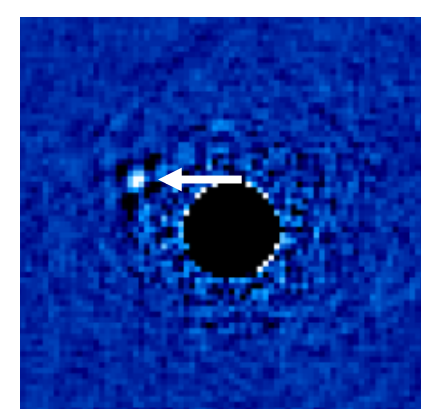
PZ Tel B



HD 984 B

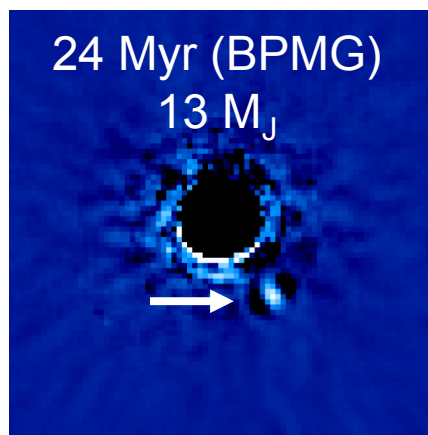


HR 2562 B

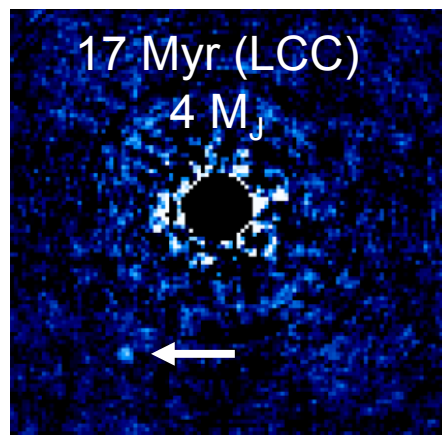


HD 206893 B

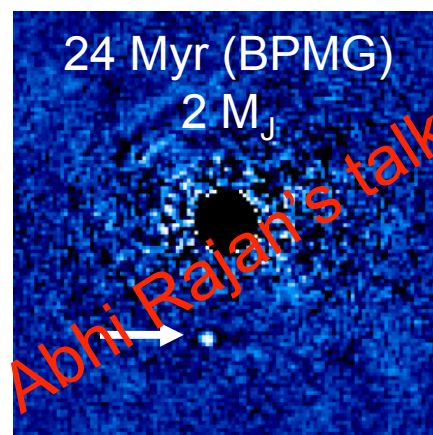
The GPIES Haul



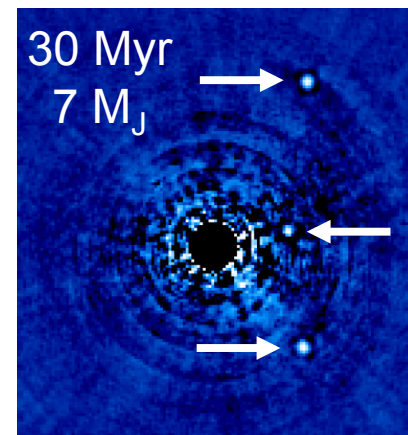
β Pic b
Chilcote et al. (2017)



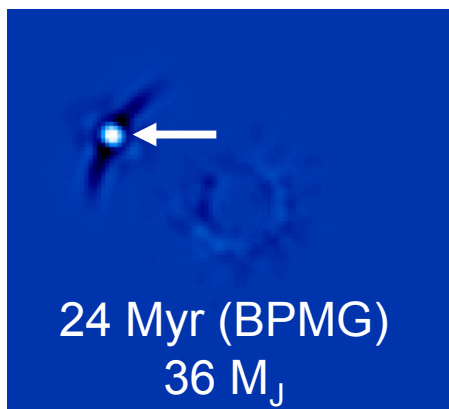
HD 95086 b
De Rosa et al. (2016)



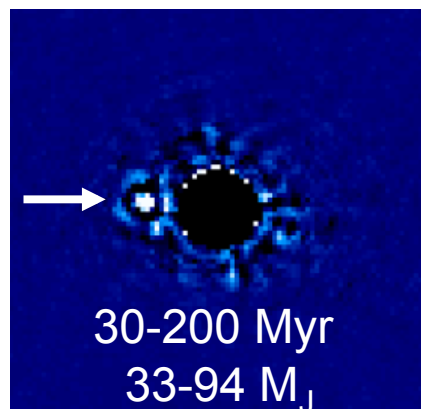
51 Eri b
Macintosh et al. (2014)
Rajan et al. (2017)



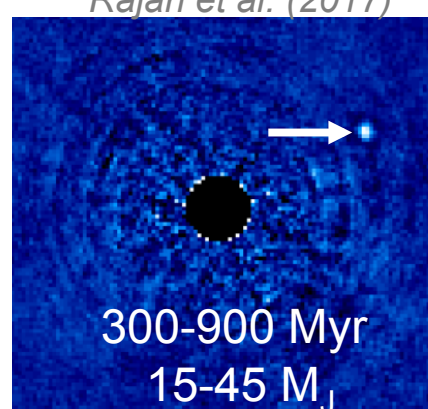
HR 8799 cde
Ingraham et al. (2014)
Greenbaum et al. (in prep)



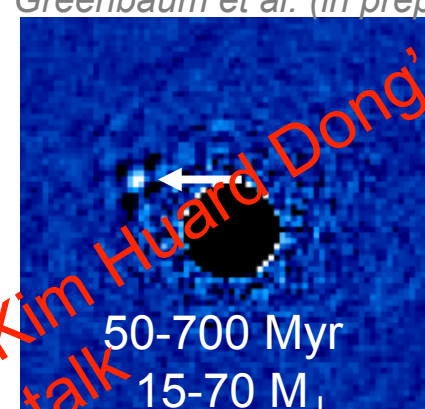
PZ Tel B
Ryan et al. (in prep.)



HD 984 B
Johnson-Groh et al. (2017)



HR 2562 B
Konopacky et al. (2016)

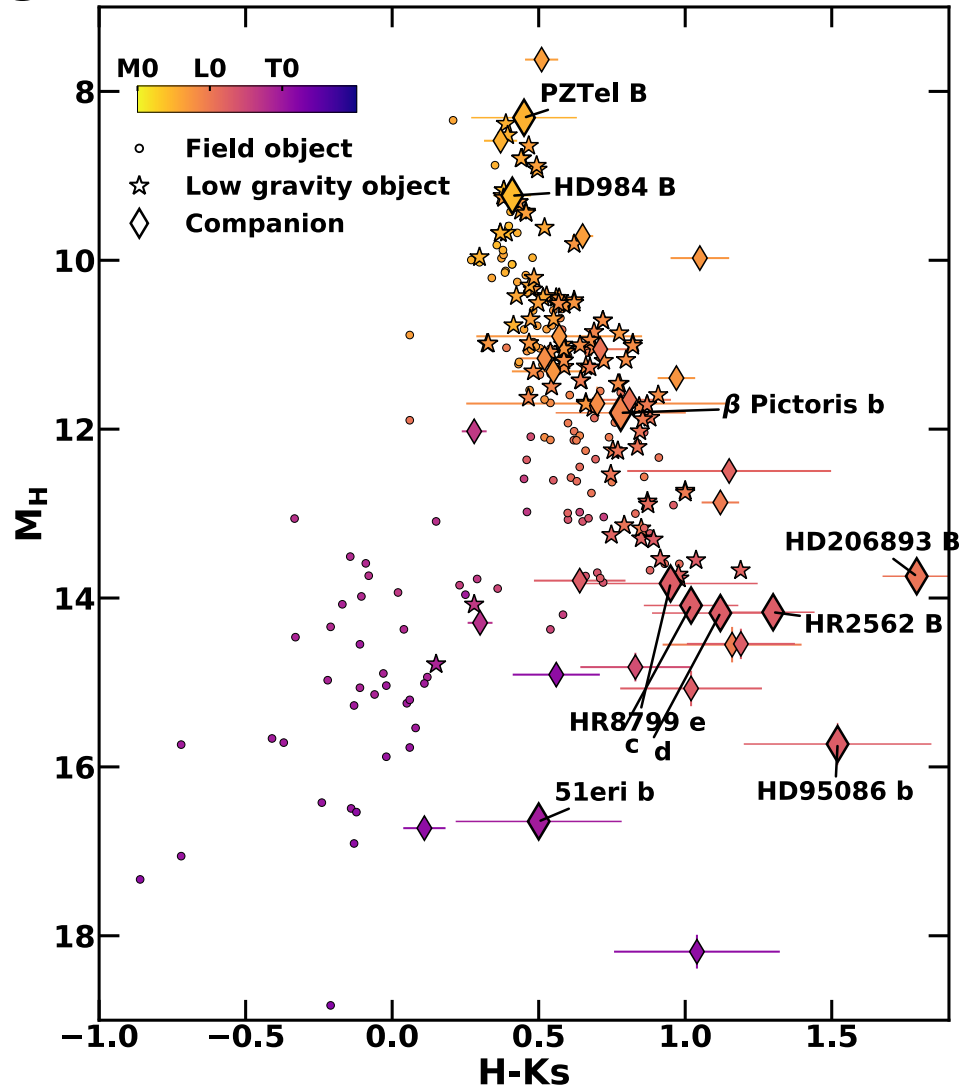


HD 206893 B
Huard-Dong et al. (in prep)

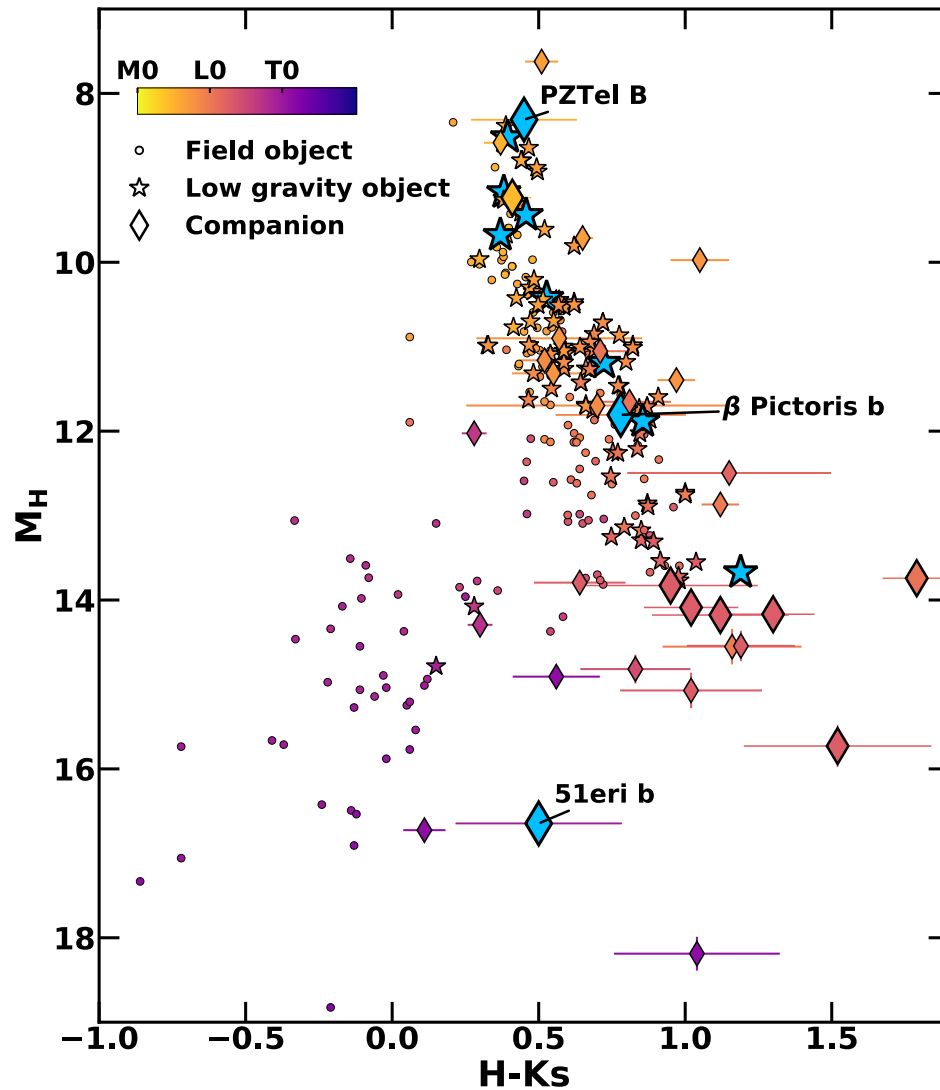
Abhi Rajan's talk

Kim Huard Dong's talk

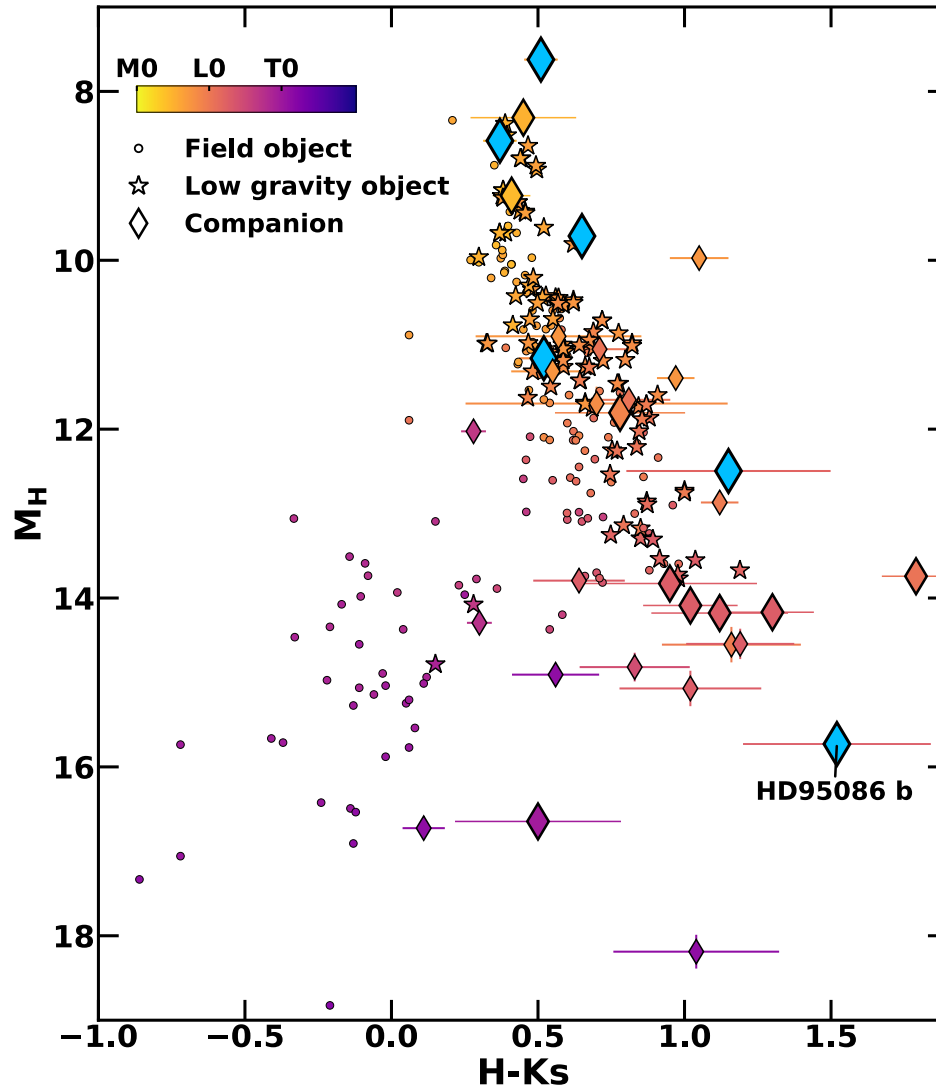
Sampling the MLT sequence with young companions



A sequence in the β Pictoris moving group



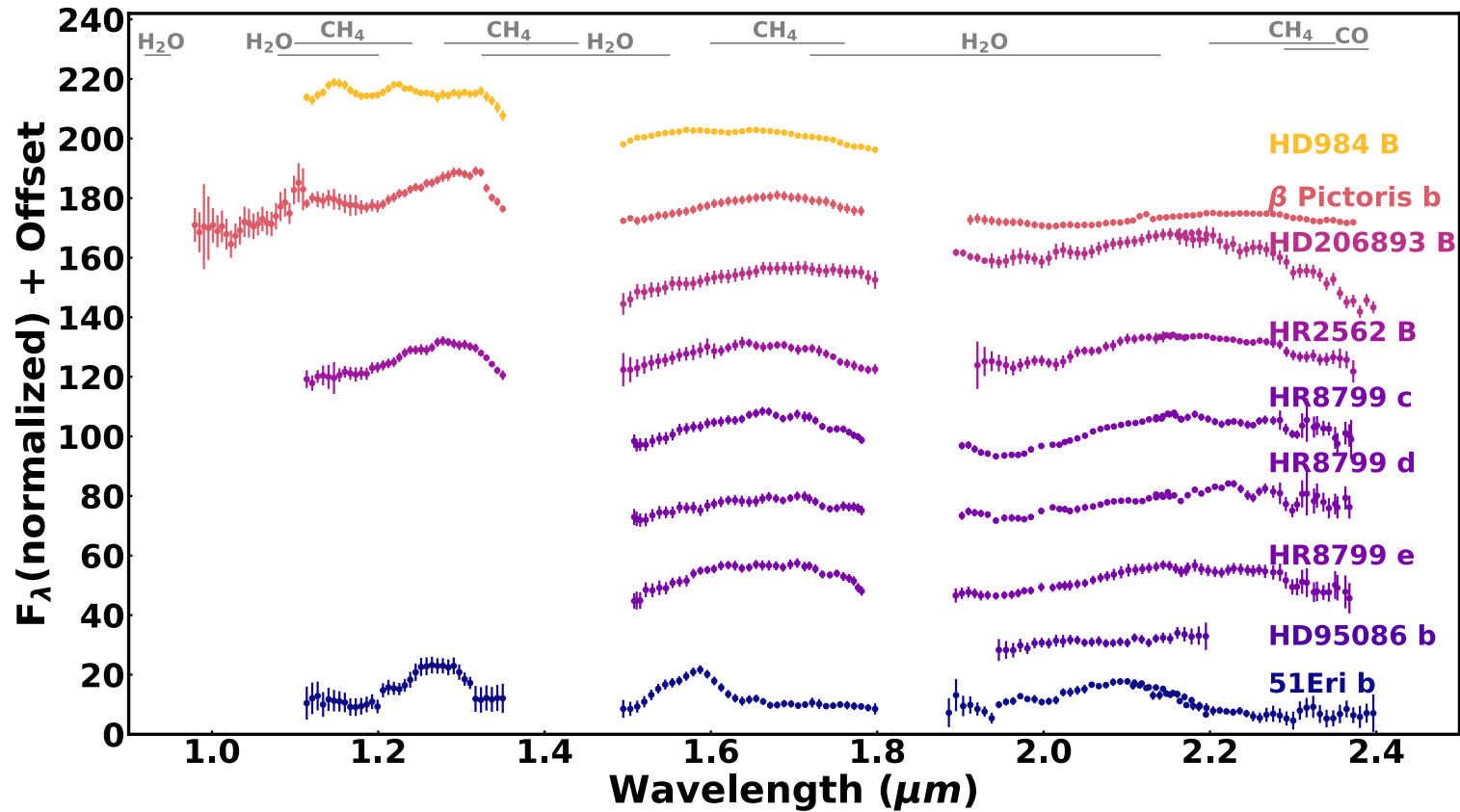
Need to find Sco-Cen brown-dwarfs !



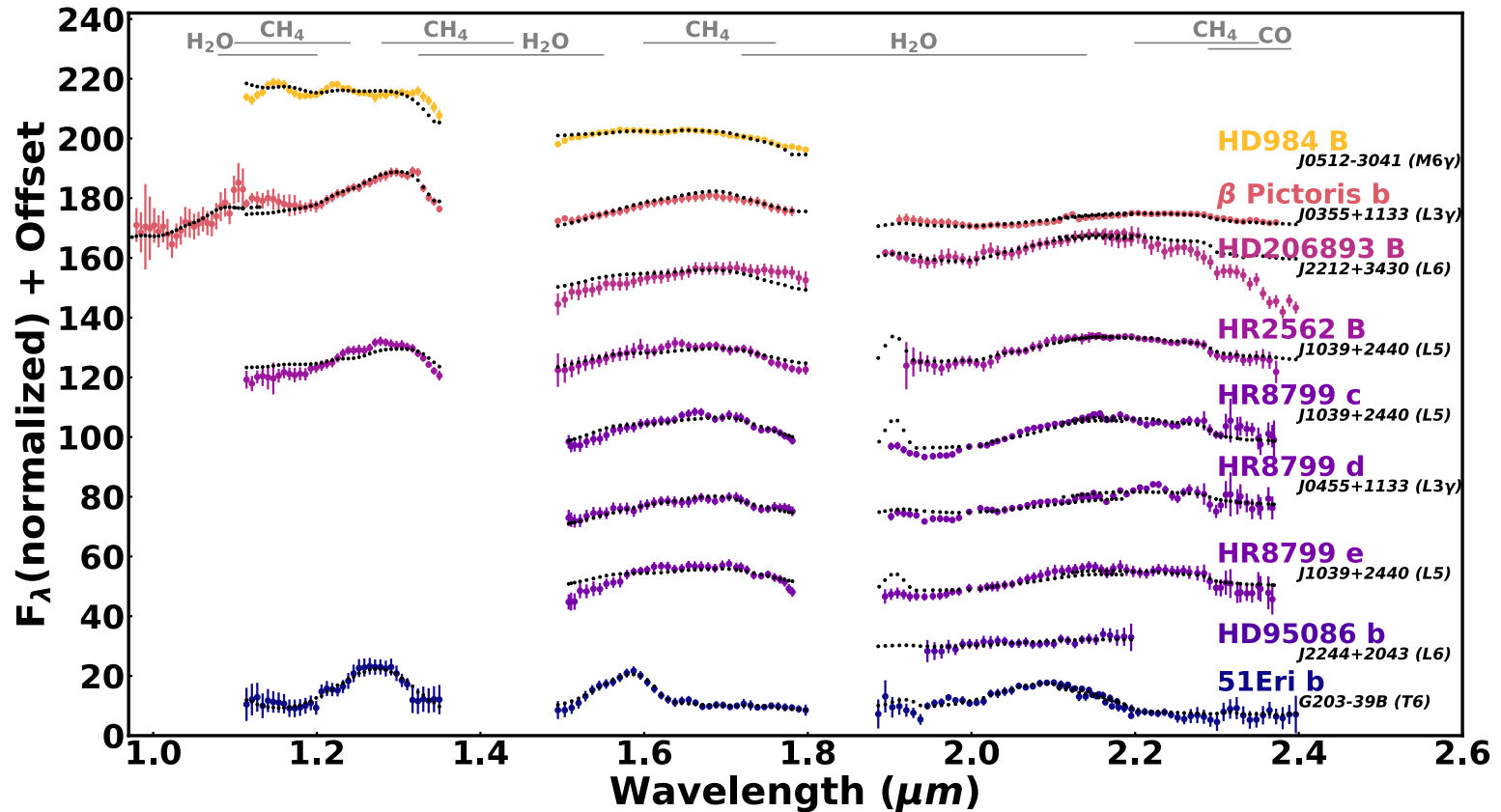


Spectrophotometry → Atmosphere

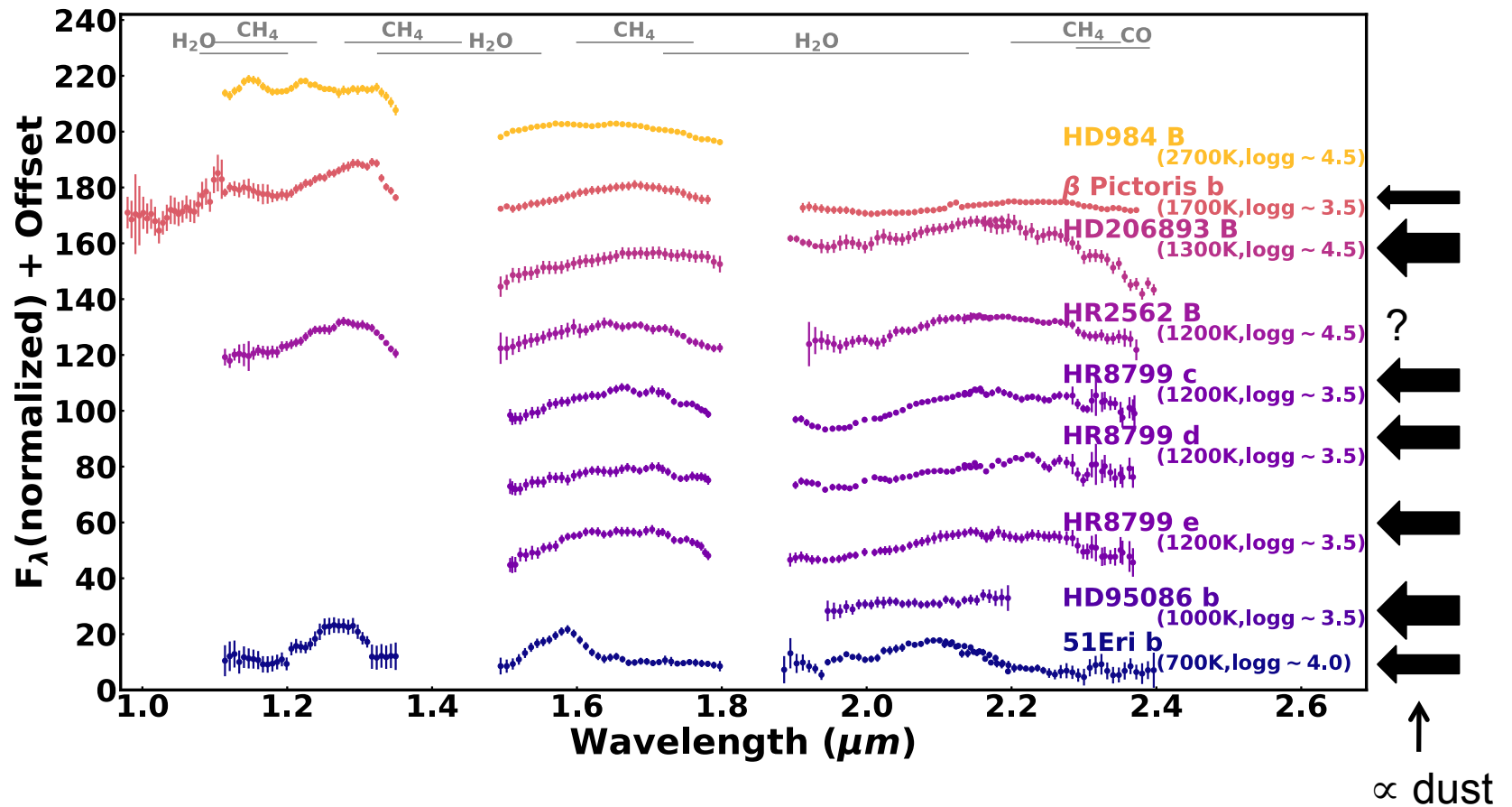
GPIES provides a uniform spectral library



Building a spectral sequence?



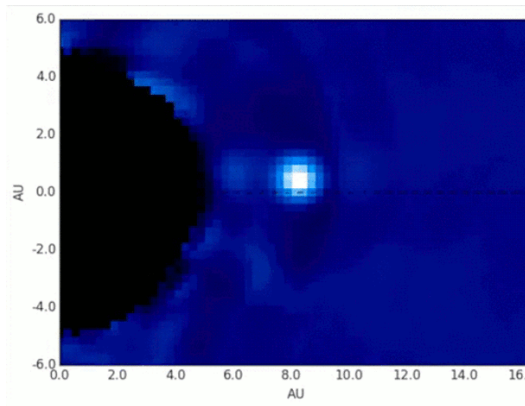
Modeling to confirm that dust is everywhere





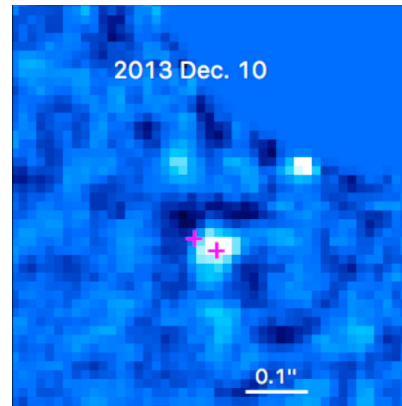
Astrometry → Orbit

Orbital motion is detectable



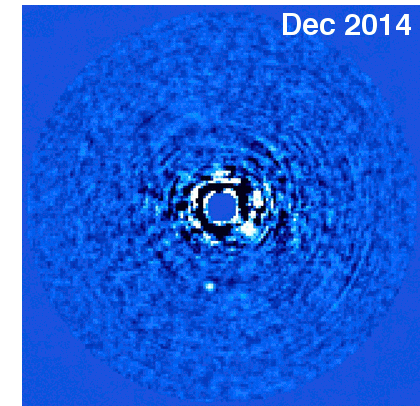
β Pictoris b
3 years
of monitoring

Millar-Blanchaer et al. (2015)
Wang et al. (2016)



HD 95086 b
2 years
of monitoring

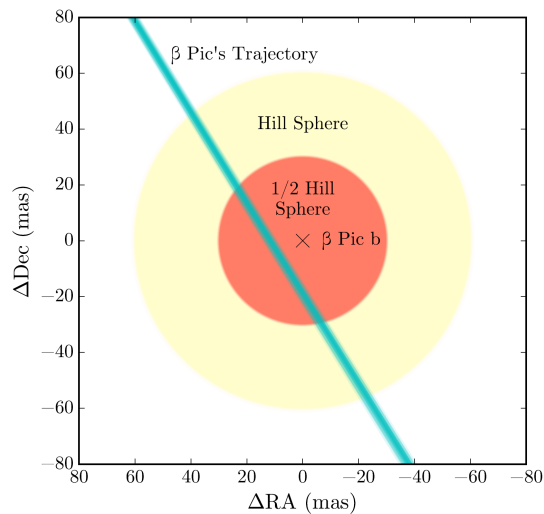
Rameau et al. (2016)



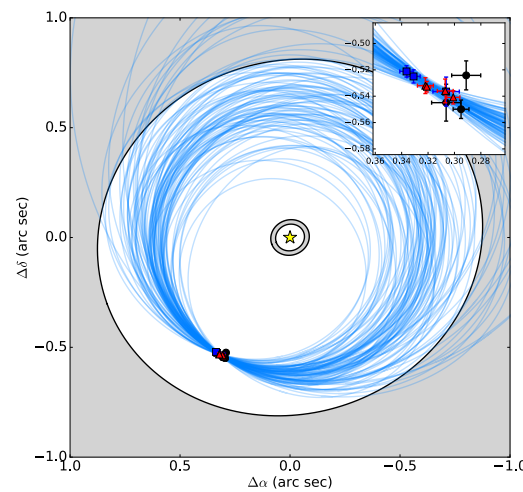
51 Eri b
10 months
of monitoring

De Rosa et al. (2015)

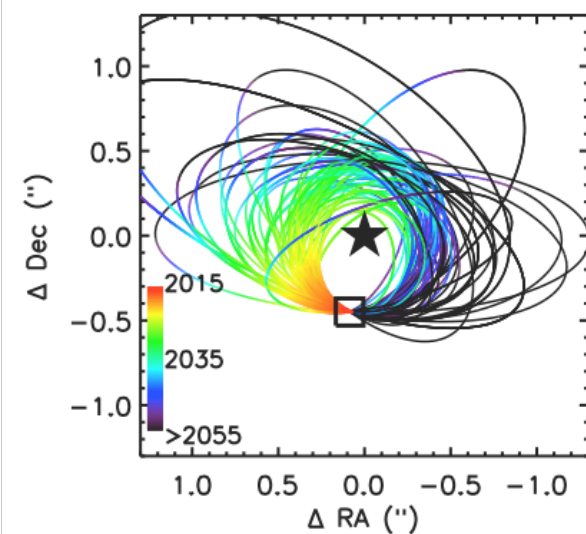
Key insights on their orbital configuration can be determined



β Pictoris b
did not transit
but
its Hill sphere did



HD 95086 b
is
a gap carving
planet



51 Eri b
might be on
an eccentric orbit

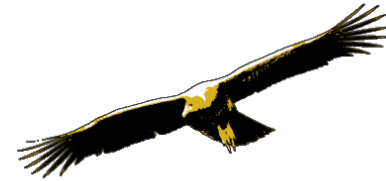
Take-out?

GPIES performs
a systematic and uniform
astrometric and spectroscopic
analysis of
young substellar companions

The GPI Zoo



Zorro
the Culpeo



Henrietta
the Condor



Vic
the Viscacha



Leopold
the Lizard of Unspecified Origin