

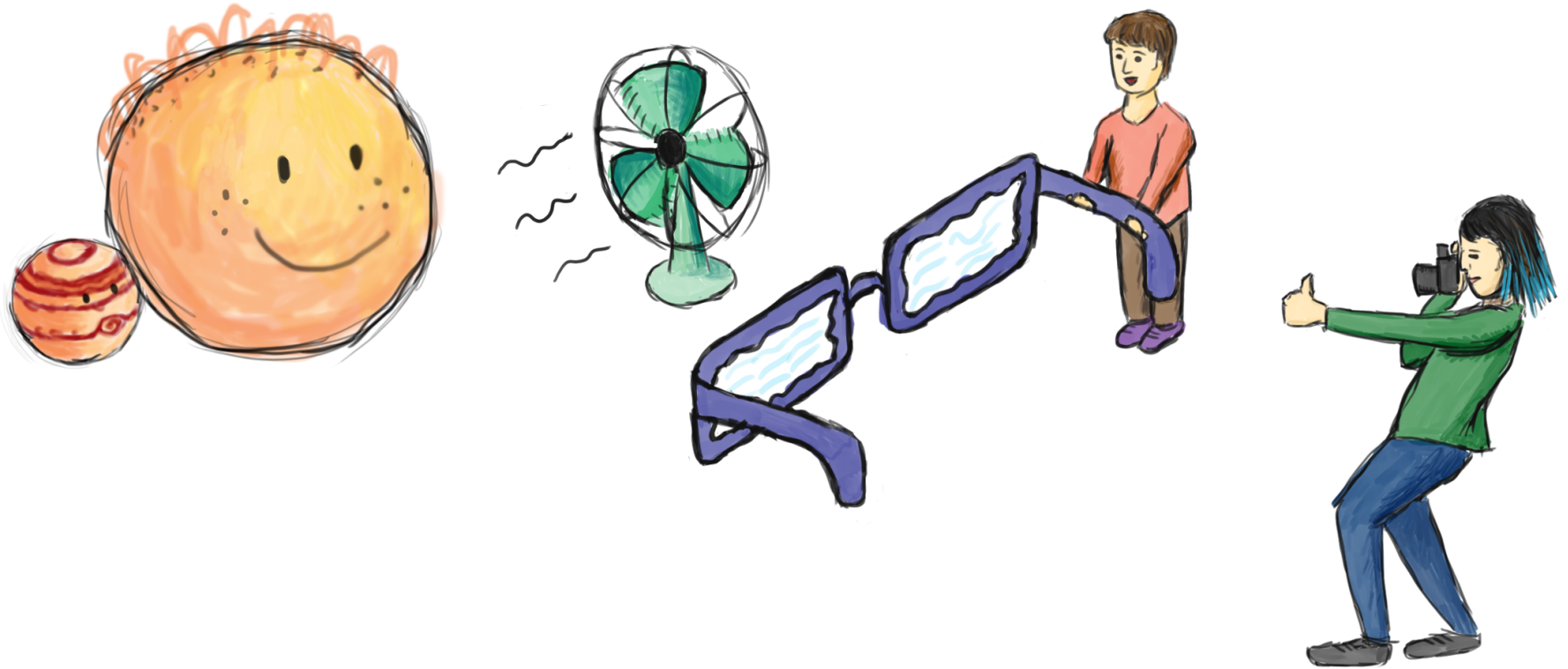


The Cautionary Tale of HD 131399 Ab

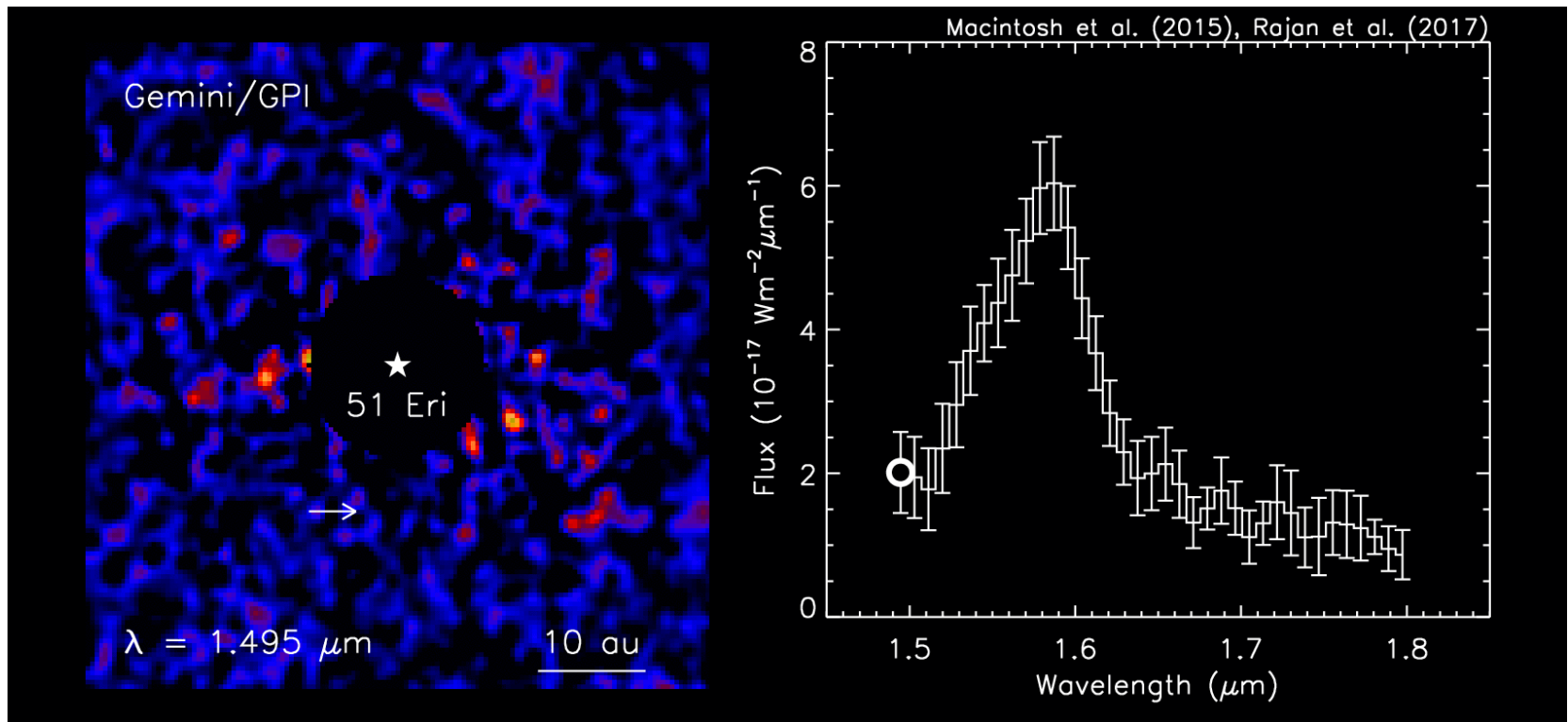
Jason Wang (UC Berkeley)

Nielsen, De Rosa, Rameau, **Wang**, et al., AJ, in press, 2017

The Gemini Planet Imager



The Gemini Planet Imager



Credit: Rob De Rosa

GPI Exoplanet Survey Updates

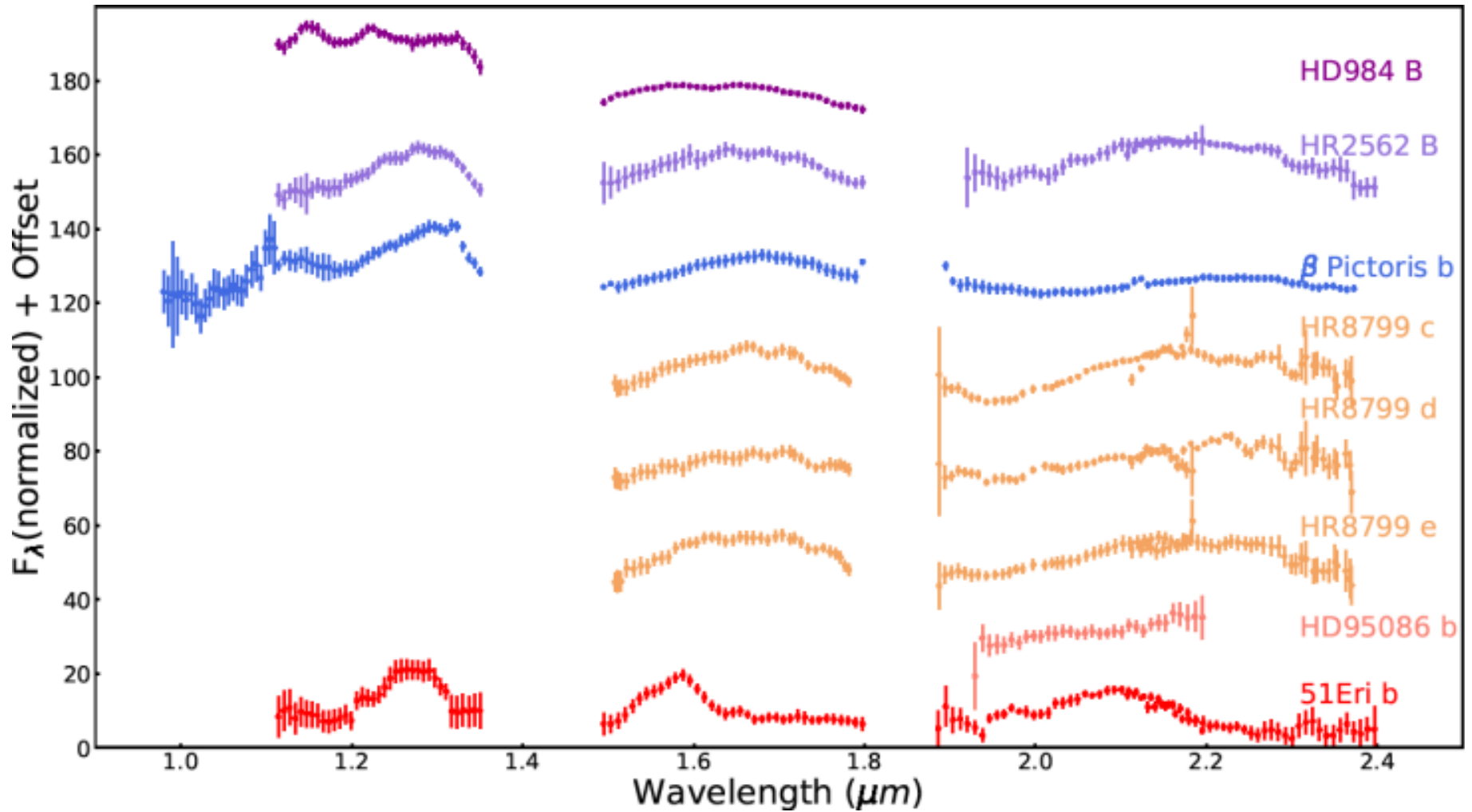
New Team Photo



New Logo

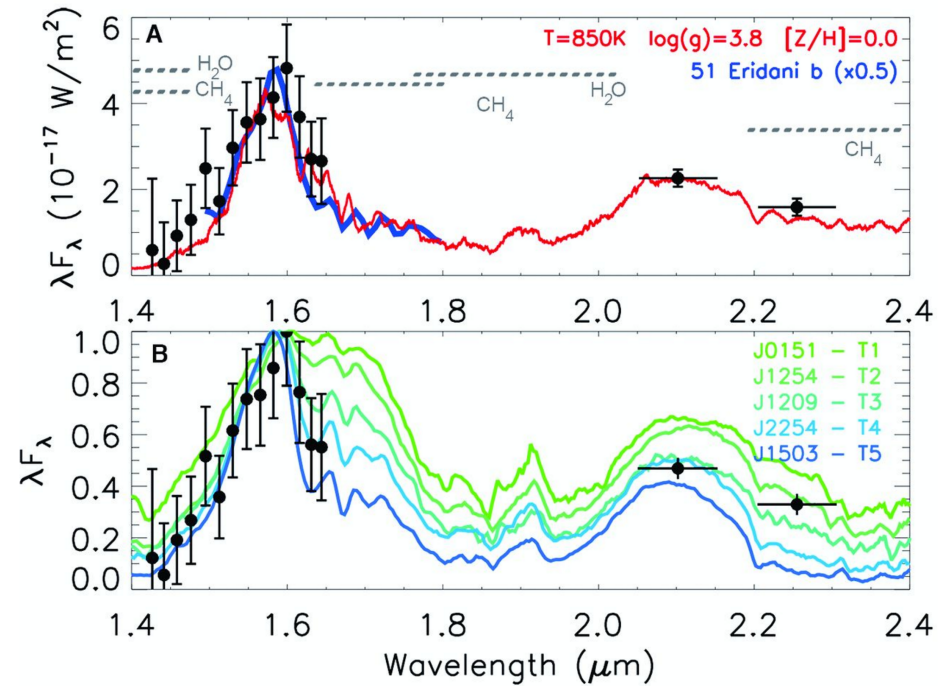
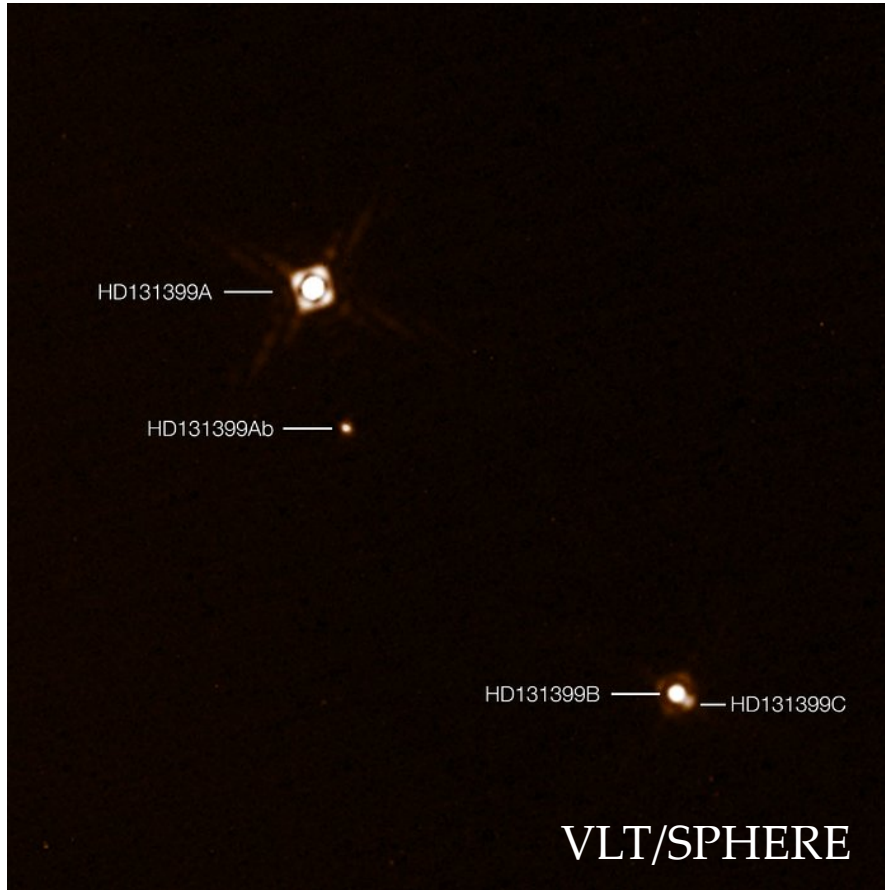


GPIES Spectral Library



Credit: Julien Rameau

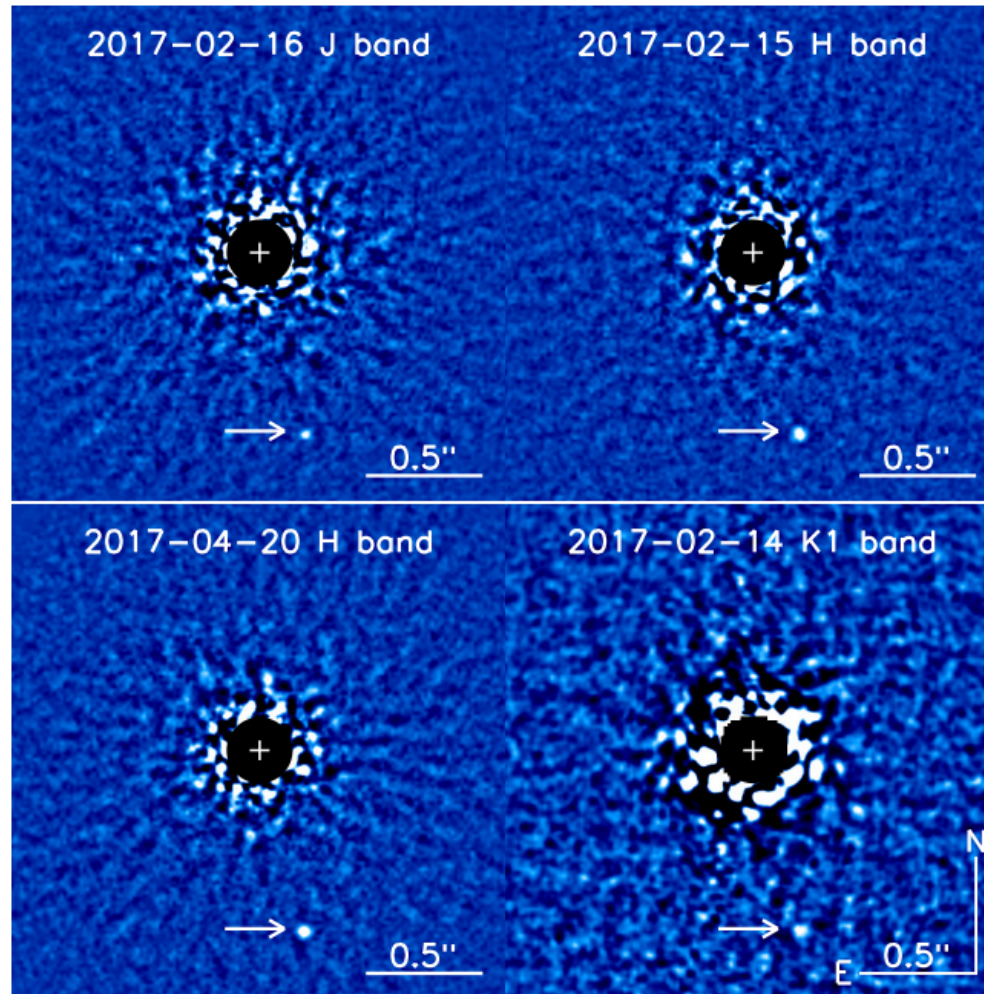
HD 131399



This candidate passed all of the standard false positive tests

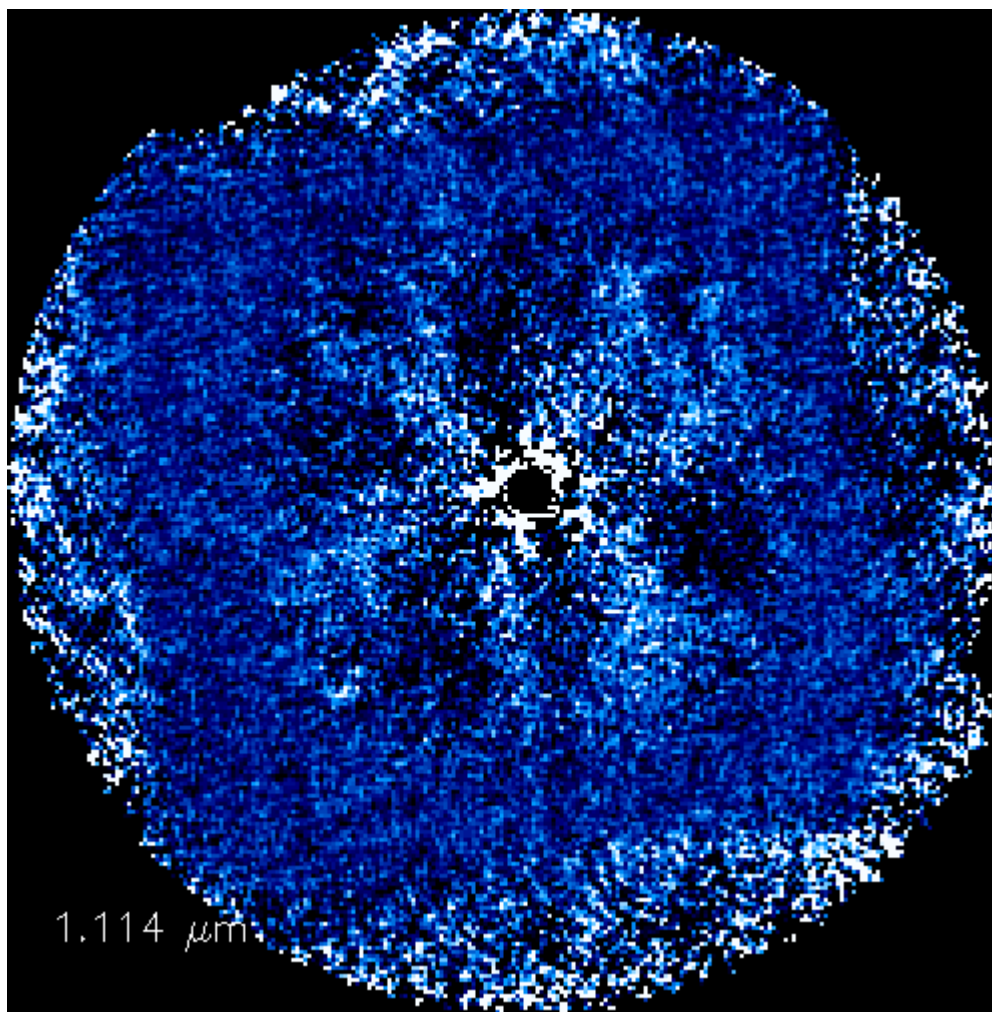
HD 131399 Ab with GPI

Reduced with two separate pipelines: pyKLIP (J. Wang) and cADI (J. Rameau)



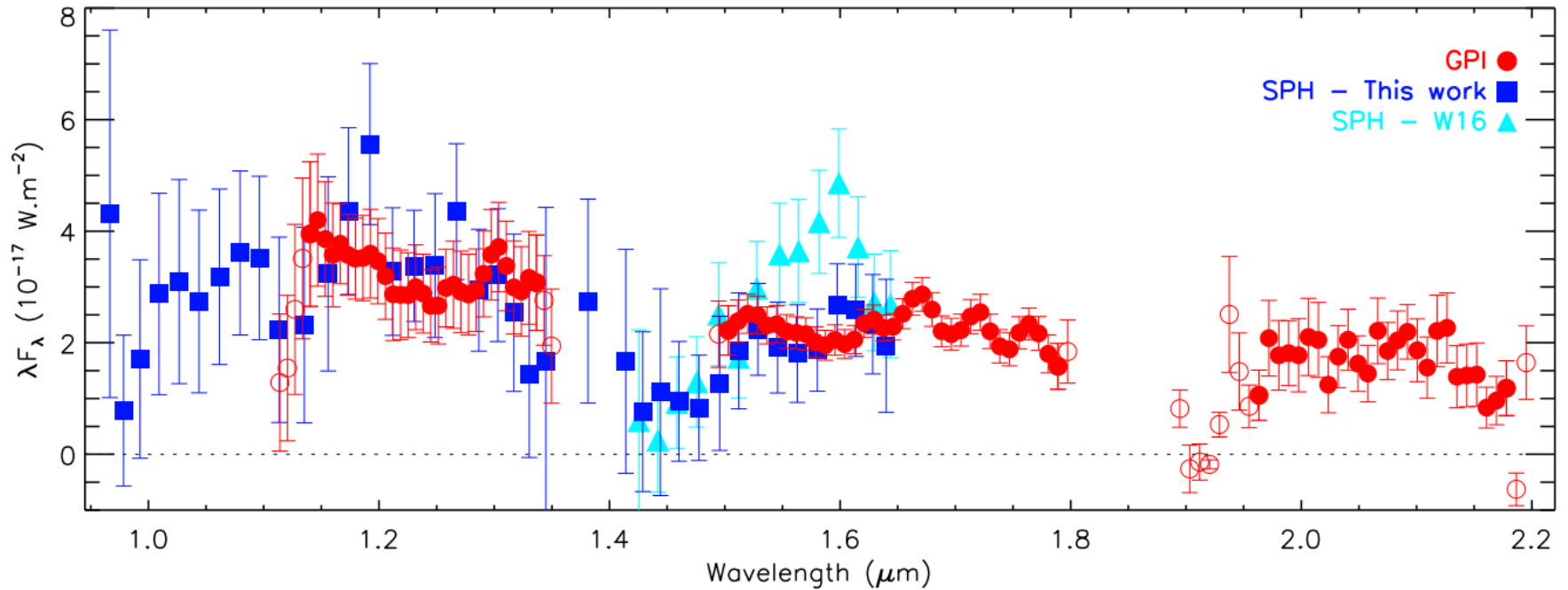
HD 131399 Ab with GPI

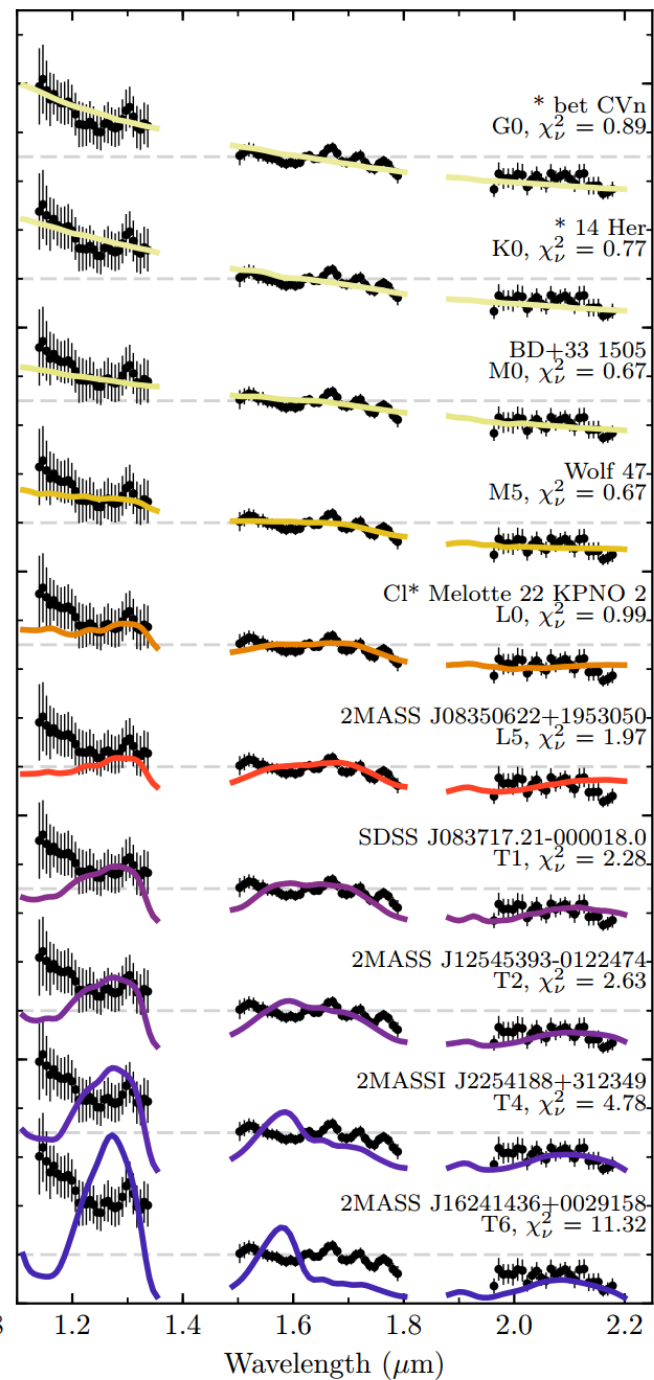
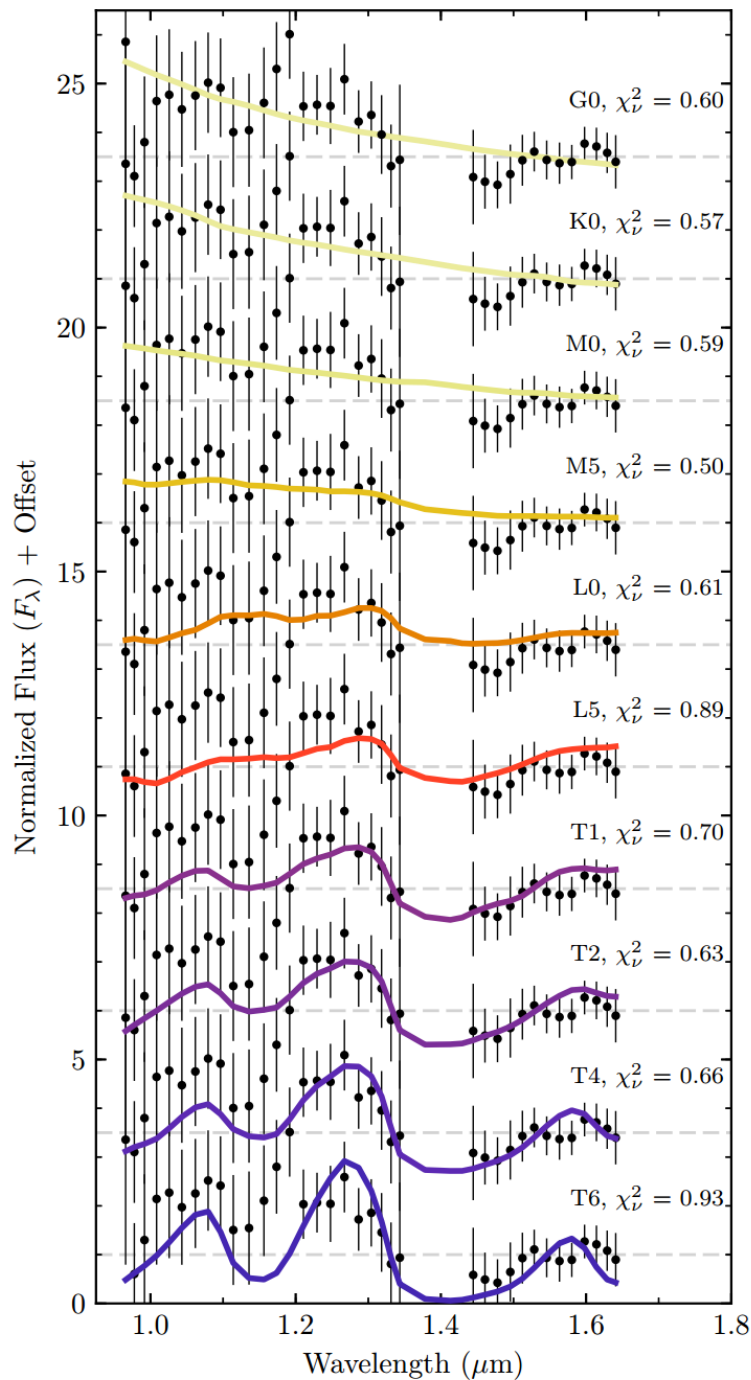
Beware of Correlated Noise



HD 131399 Ab Spectra

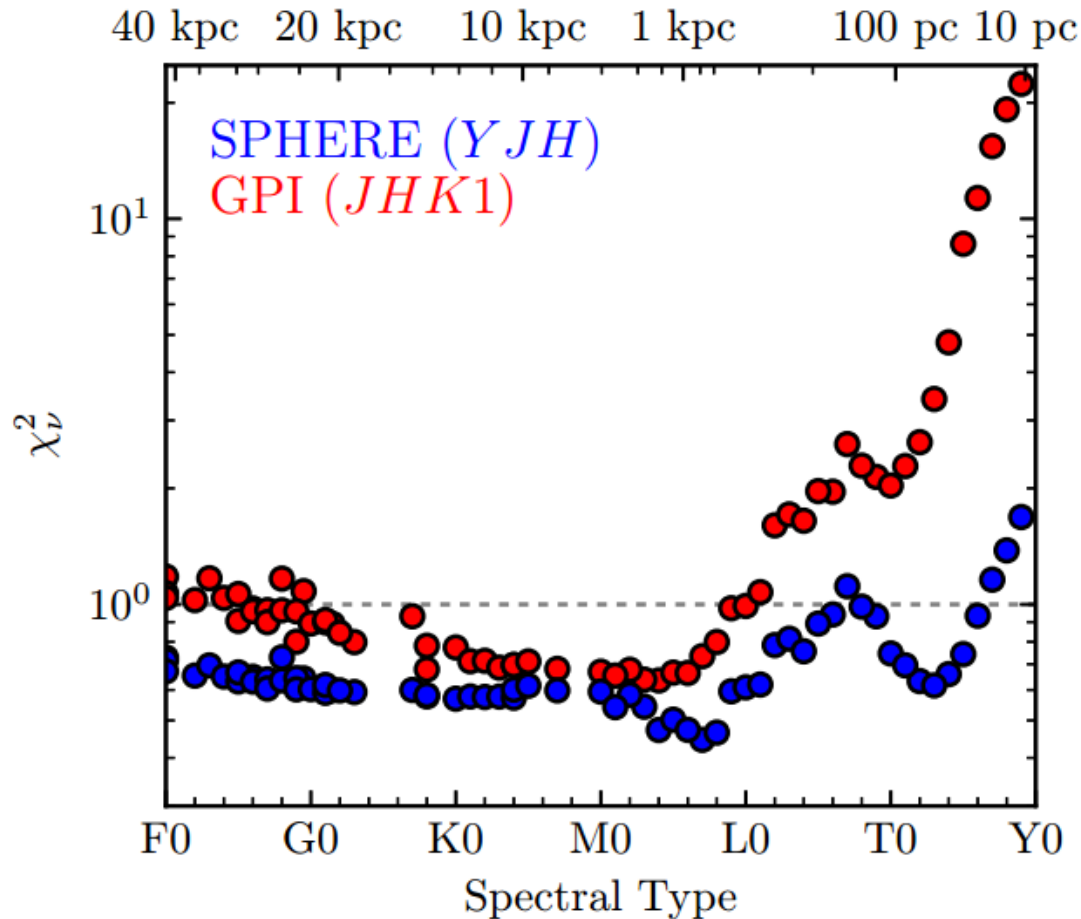
Beware of Correlated Noise





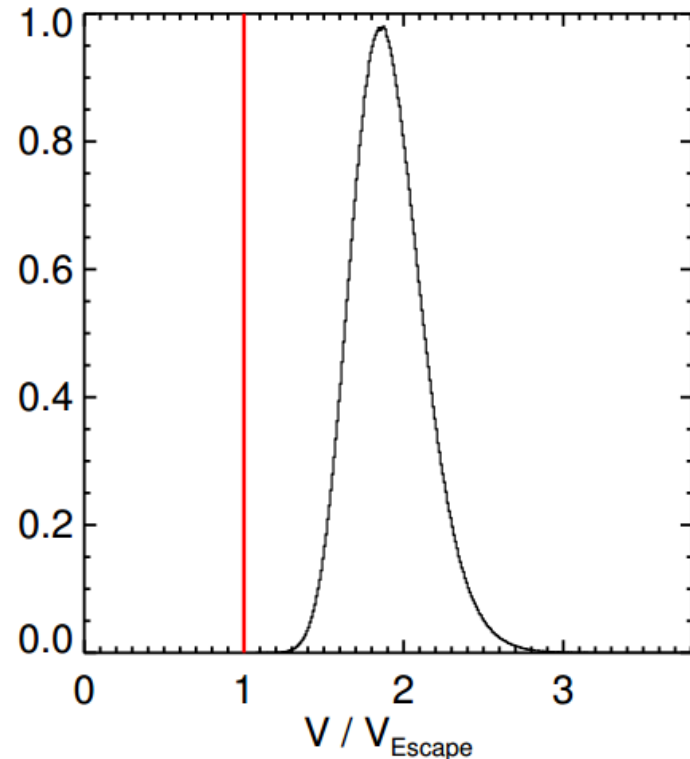
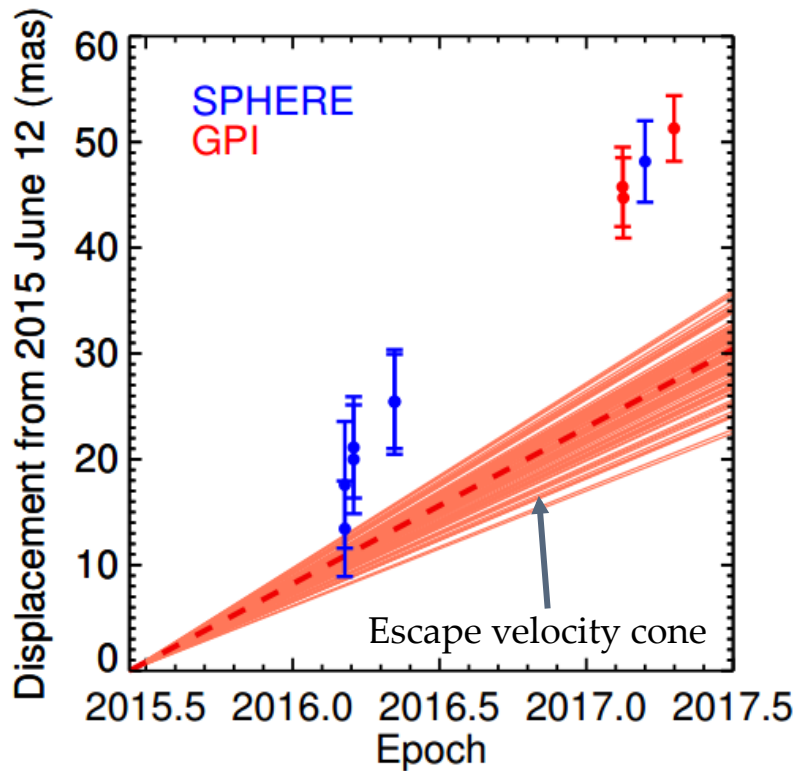
HD 131399 Ab Spectral Type

Not an L- or T-type spectrum



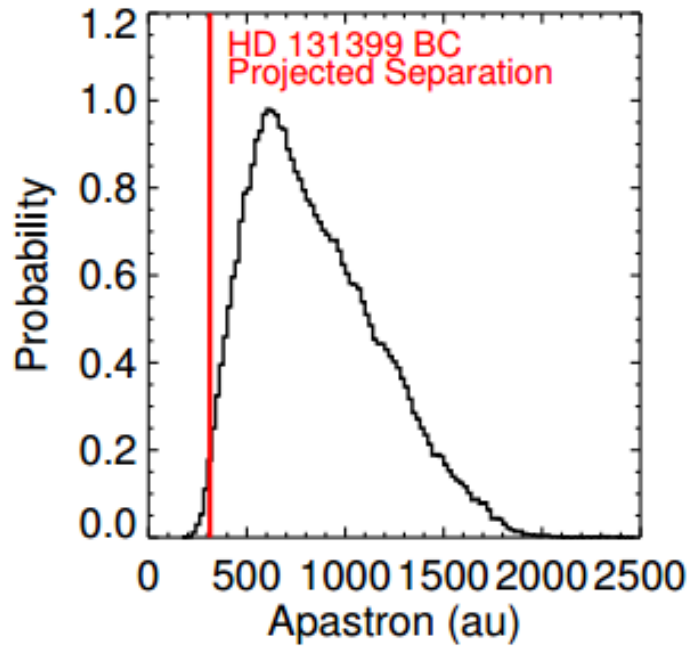
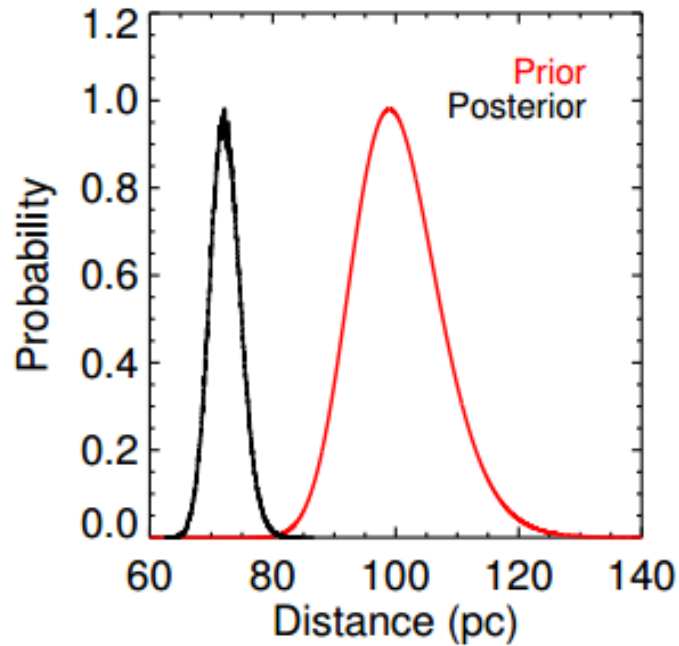
HD 131399 Ab Astrometry

If bound, HD 131399 Ab is moving faster than escape velocity

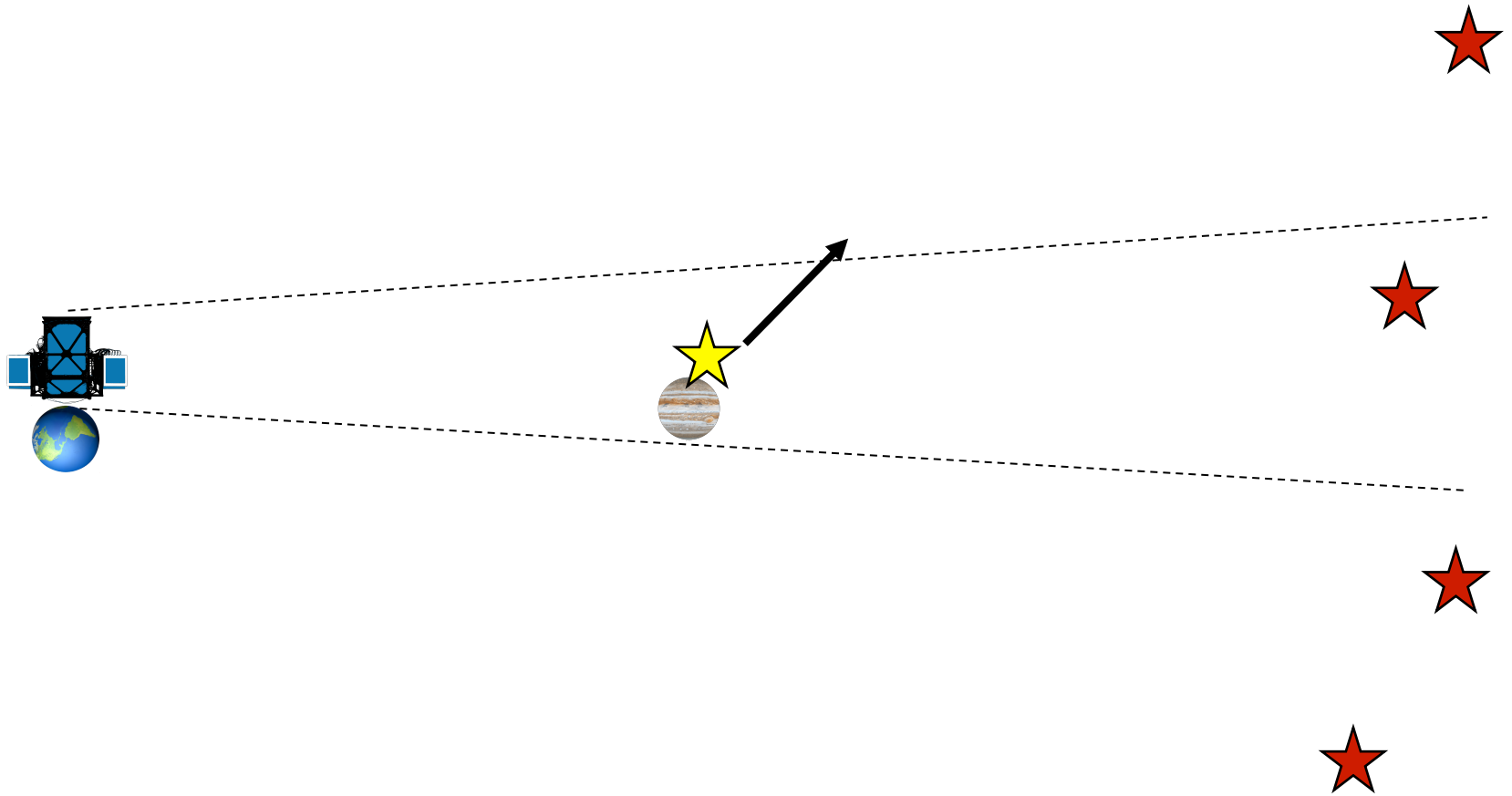


HD 131399 Ab Astrometry

Fitting an orbit gives unrealistic parameters for the system

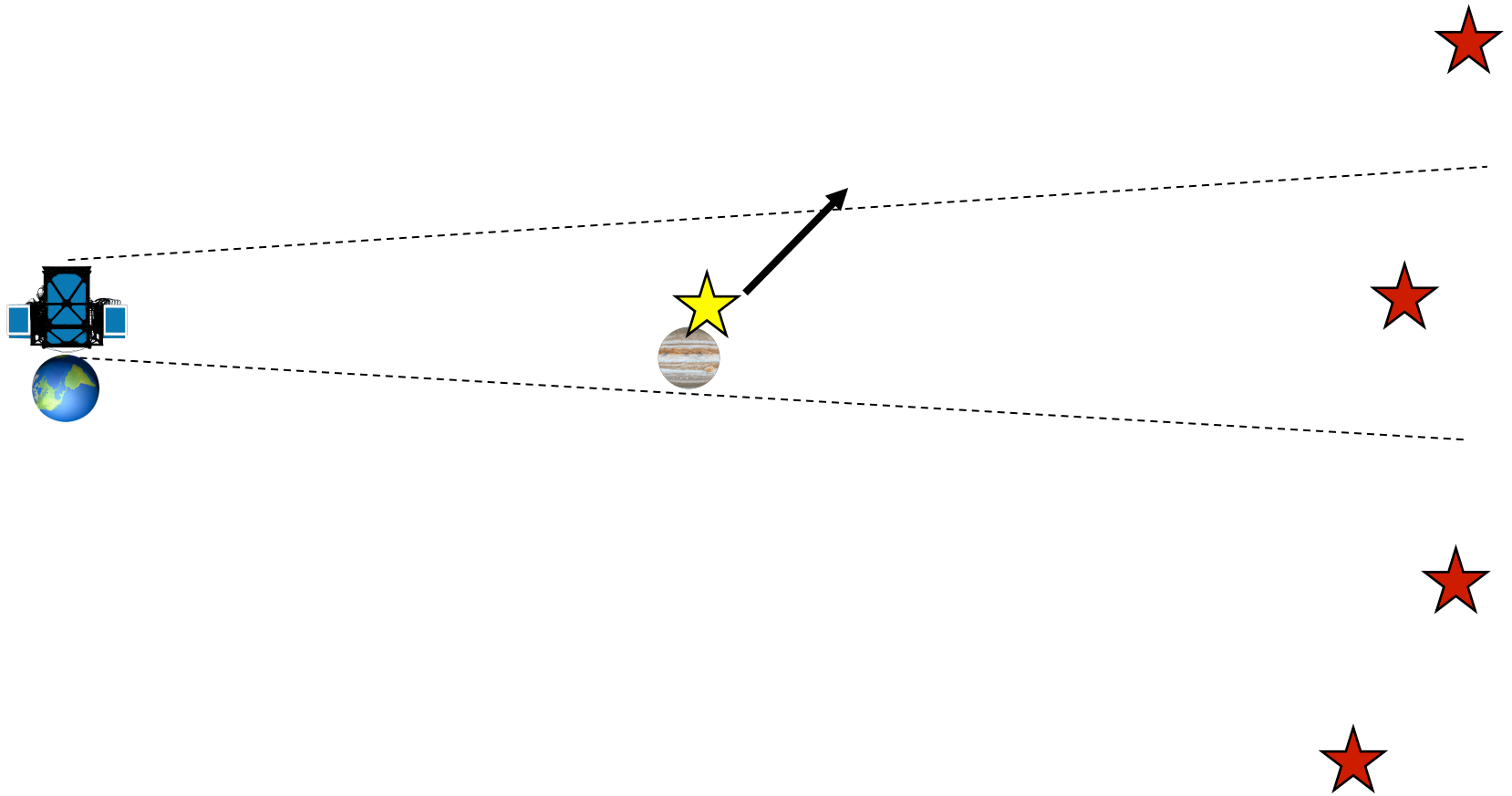


Background Objects



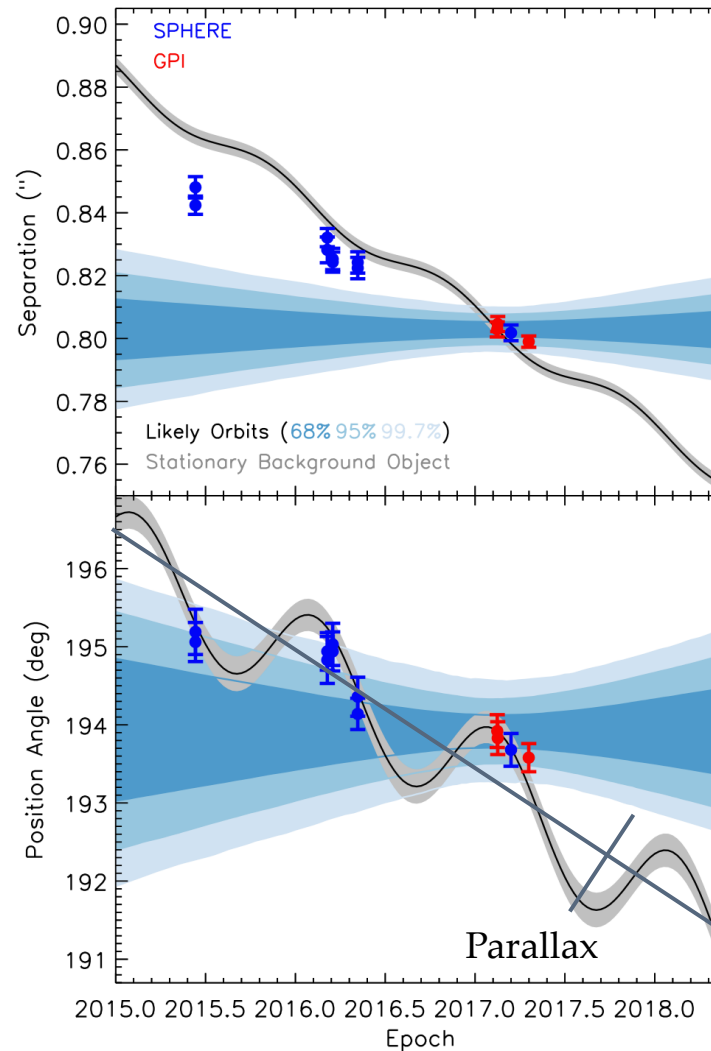
Adapted from Eric Nielsen

Background Objects



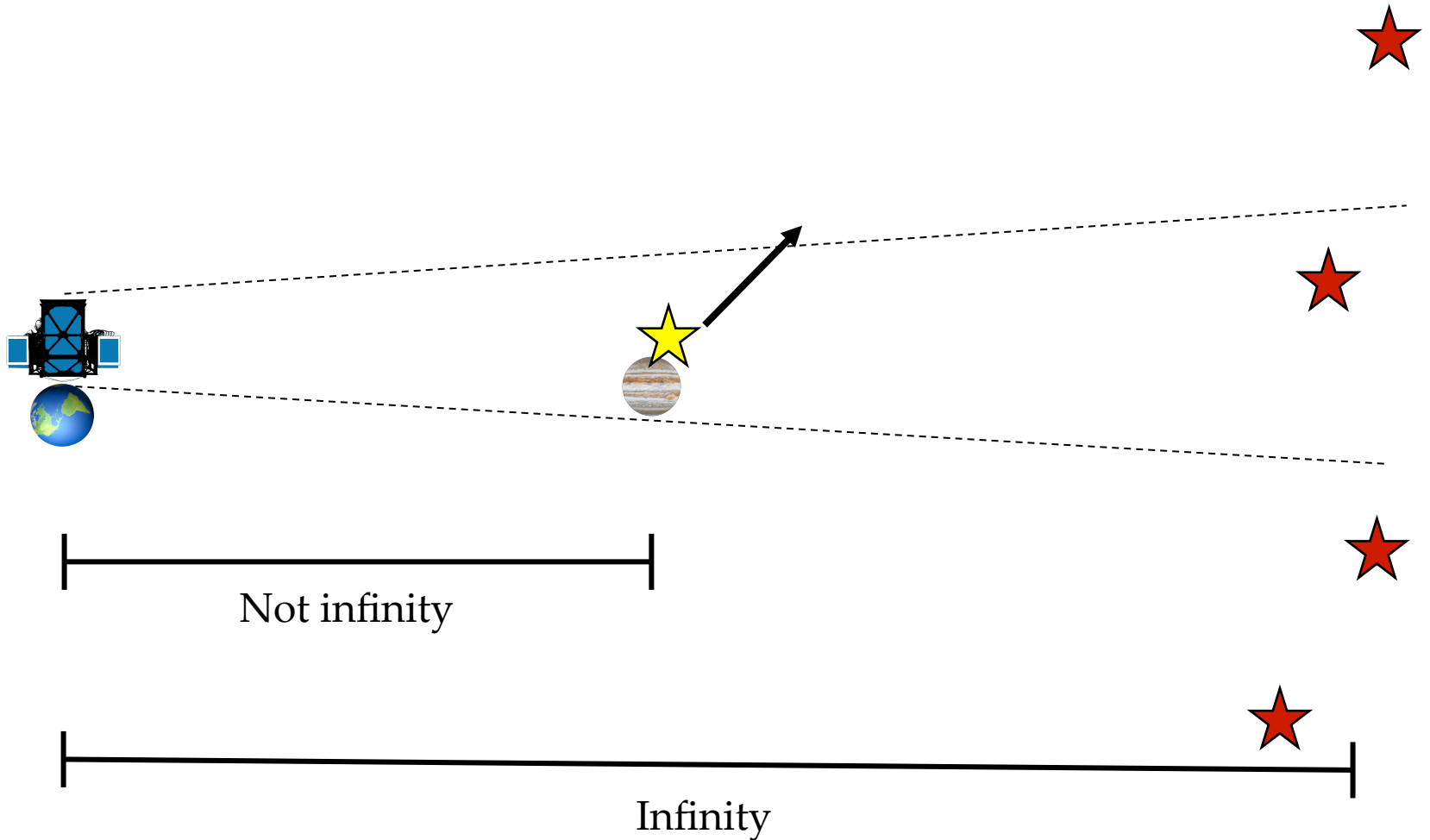
Adapted from Eric Nielsen

Doesn't Follow the Background Track



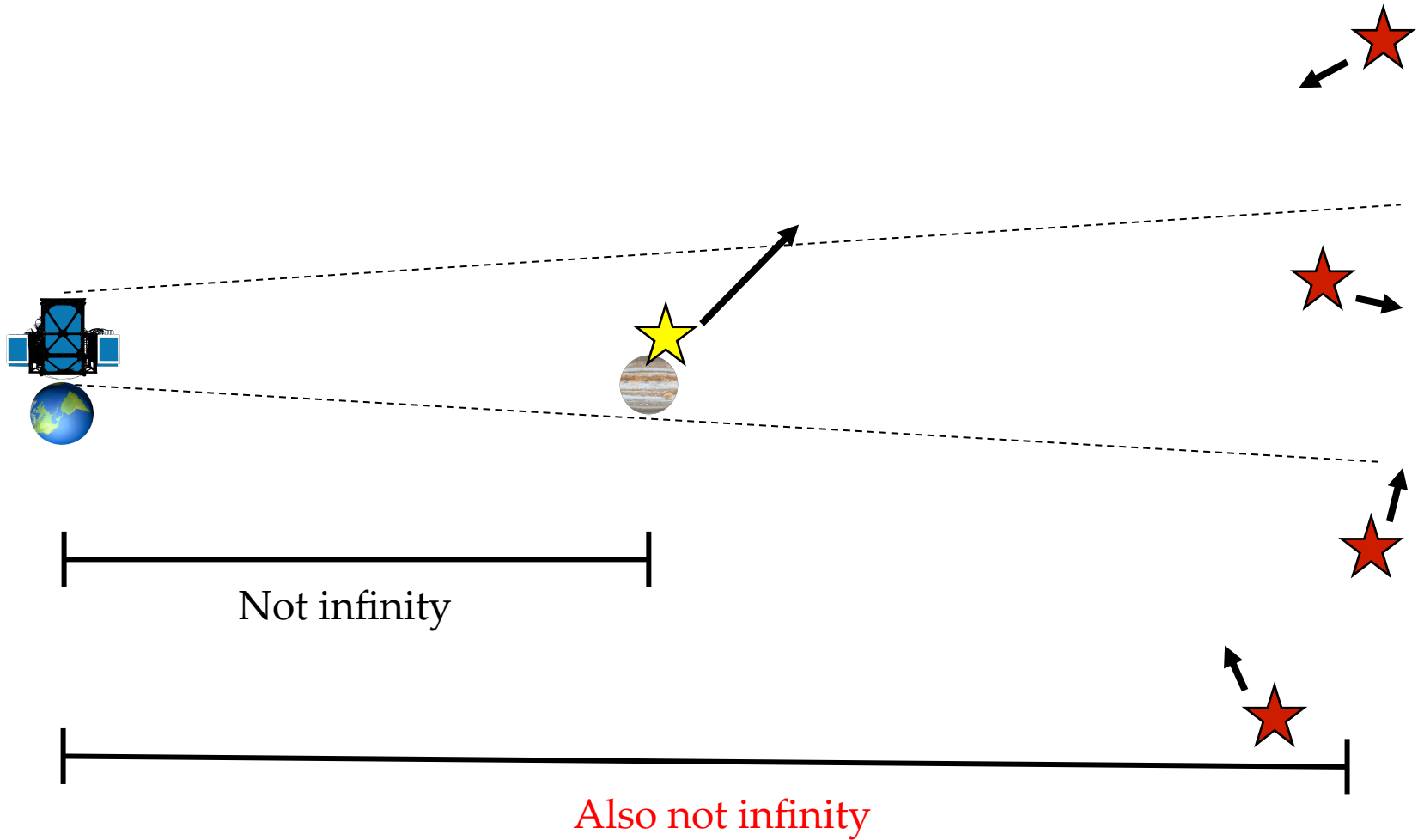
But also not in the
cone of possible
orbits!

Background Objects



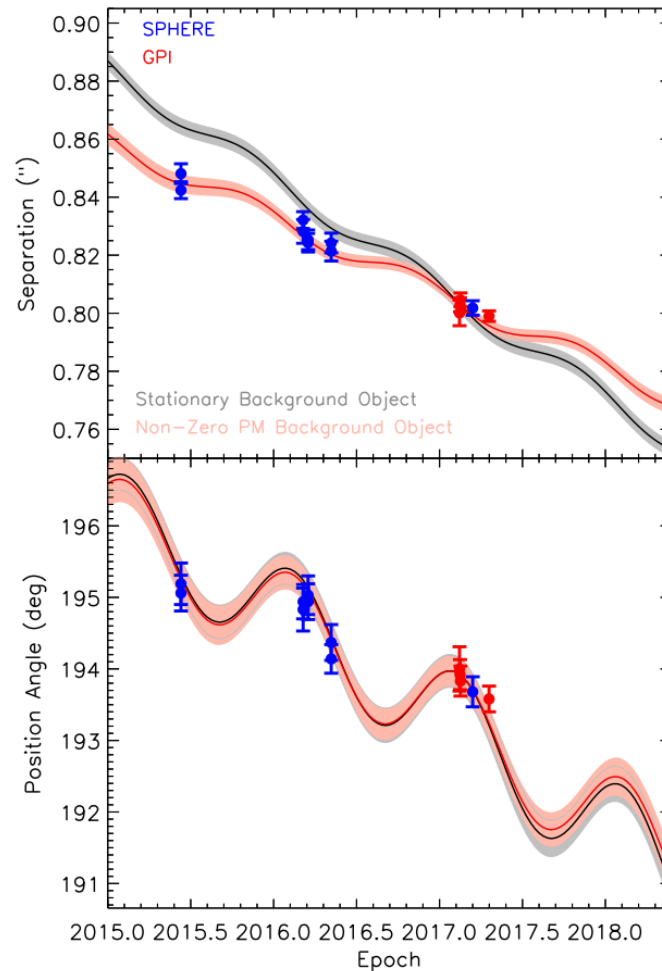
Adapted from Eric Nielsen

Background Objects



Adapted from Eric Nielsen

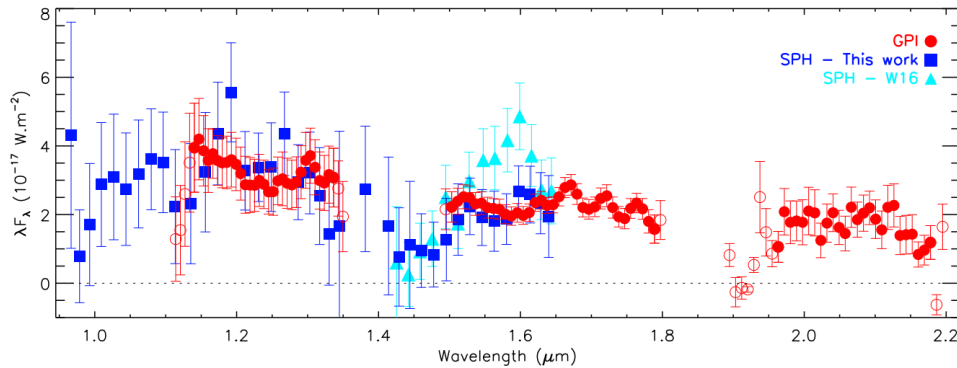
A Non-zero Proper Motion Background Object



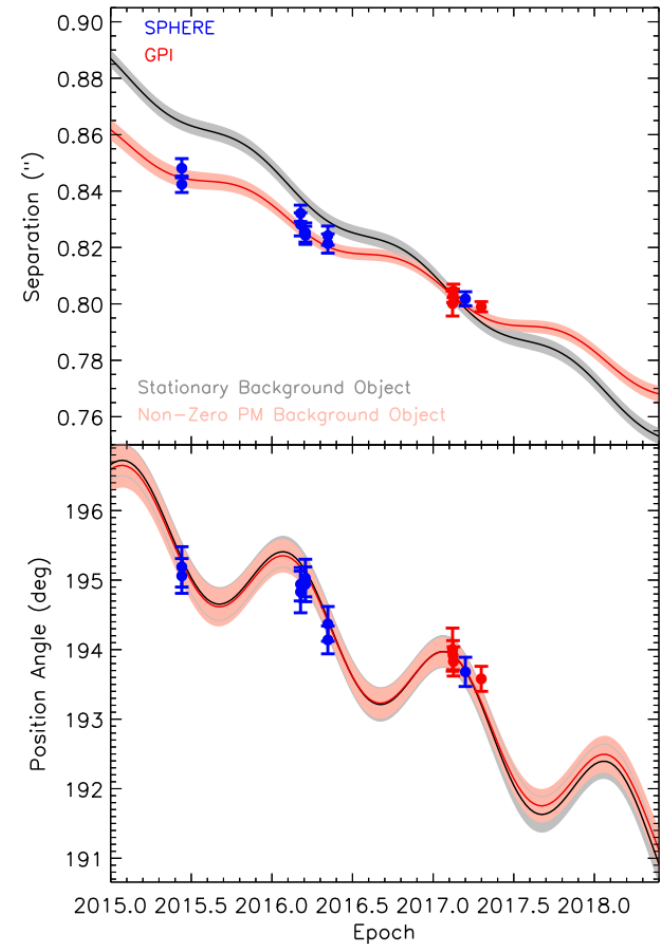
~12 mas/yr!

HD 131399 Ab is a Background Object

M-dwarf Spectra



Non-zero Proper Motion



Lessons Learned for Following Up Candidates

- Pipeline systematics exist
 - Use multiple data reduction pipelines on faint sources
- Spectral noise is correlated
 - Data with broad spectral coverage or from multiple instruments is needed
- We can measure nonstationary background objects
 - Need to rule out both stationary and non-stationary background objects
 - Otherwise, need to be very confident on spectral typing

Color Magnitude Diagram

