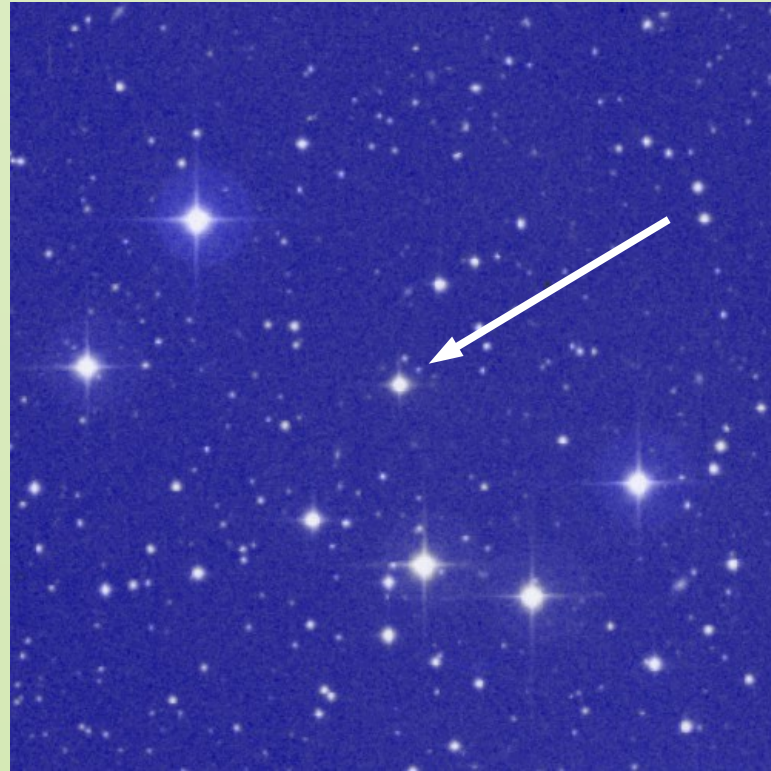


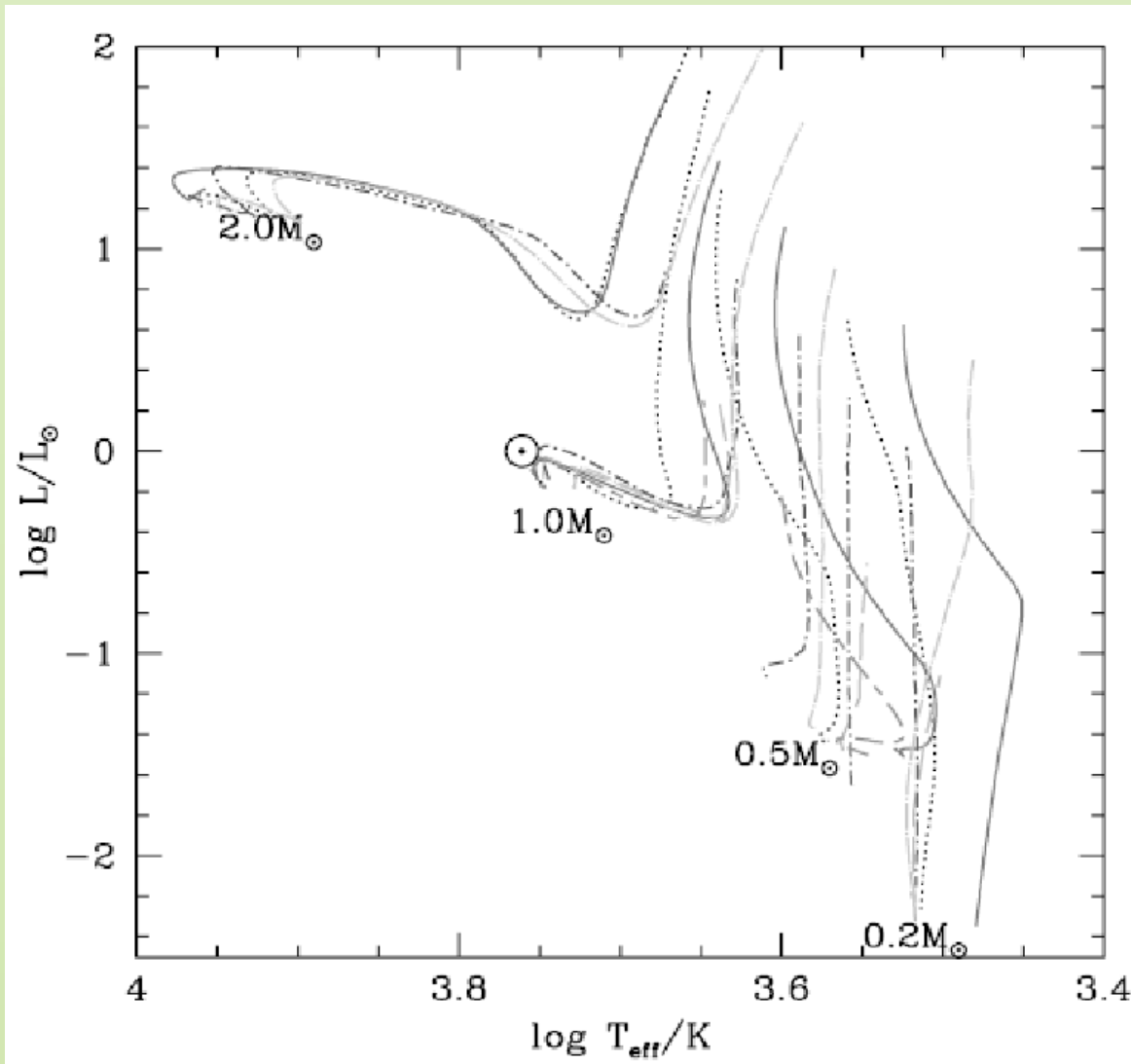
A New Pre-Main-Sequence Eclipsing Binary



Eric Stempels, University of St Andrews

*Leslie Hebb (St Andrews), Keivan Stassun (Vanderbilt),
John Holtzman (NMSU), Nick Dunstone (St Andrews),
Lars Glowienka (NOT), Søren Frandsen (Århus)*

A New Pre-Main-Sequence Eclipsing Binary



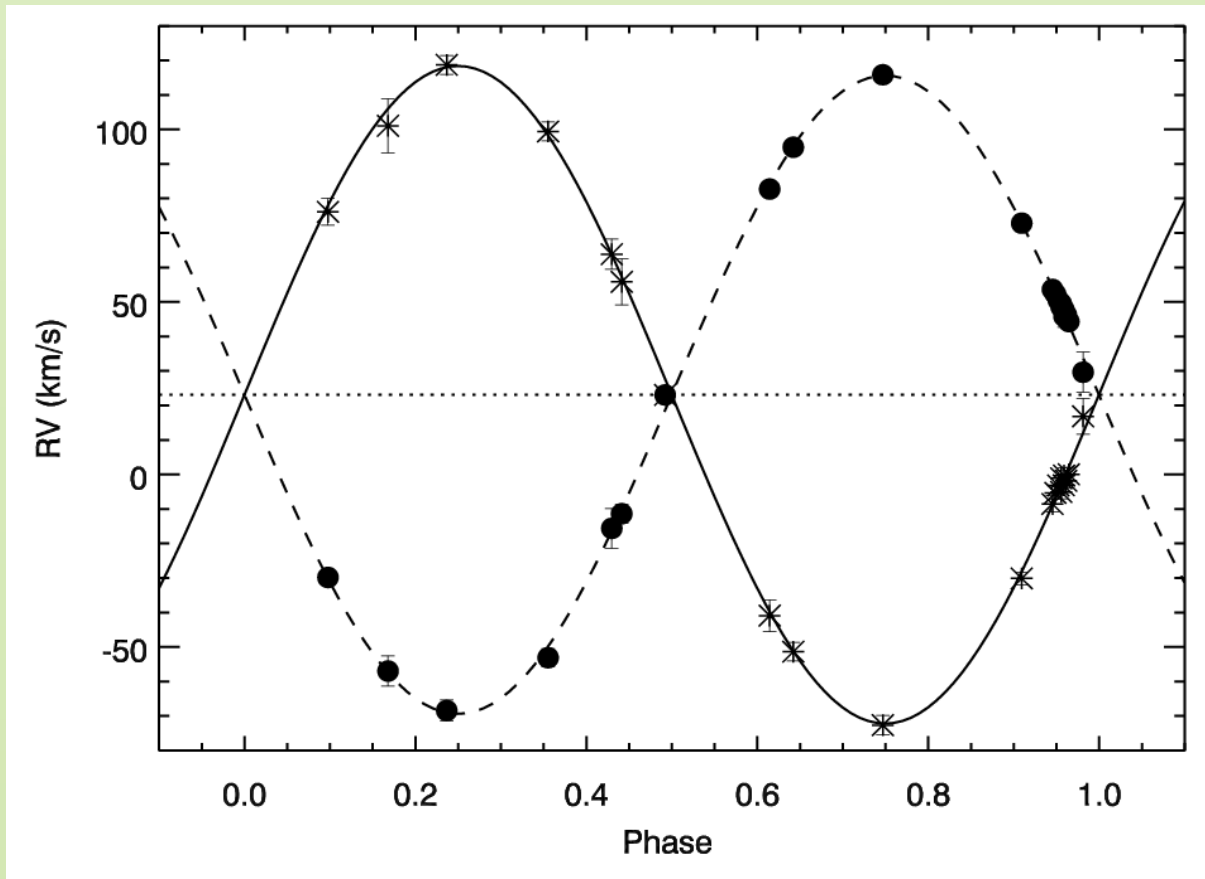
(Hillenbrand & White 2004, ApJ 604, 741)

There exists a large variation in the evolutionary tracks of PMS stars.

Empirical mass and radius measurements necessary to constrain the models.

EK Cep, TY CrA,
RXJ 0529.4+0041
(Covino et al. 2000),
V1174 Ori
(Stassun et al. 2004)
2MASS J05352184-
20130546085
(Stassun et al. 2006)

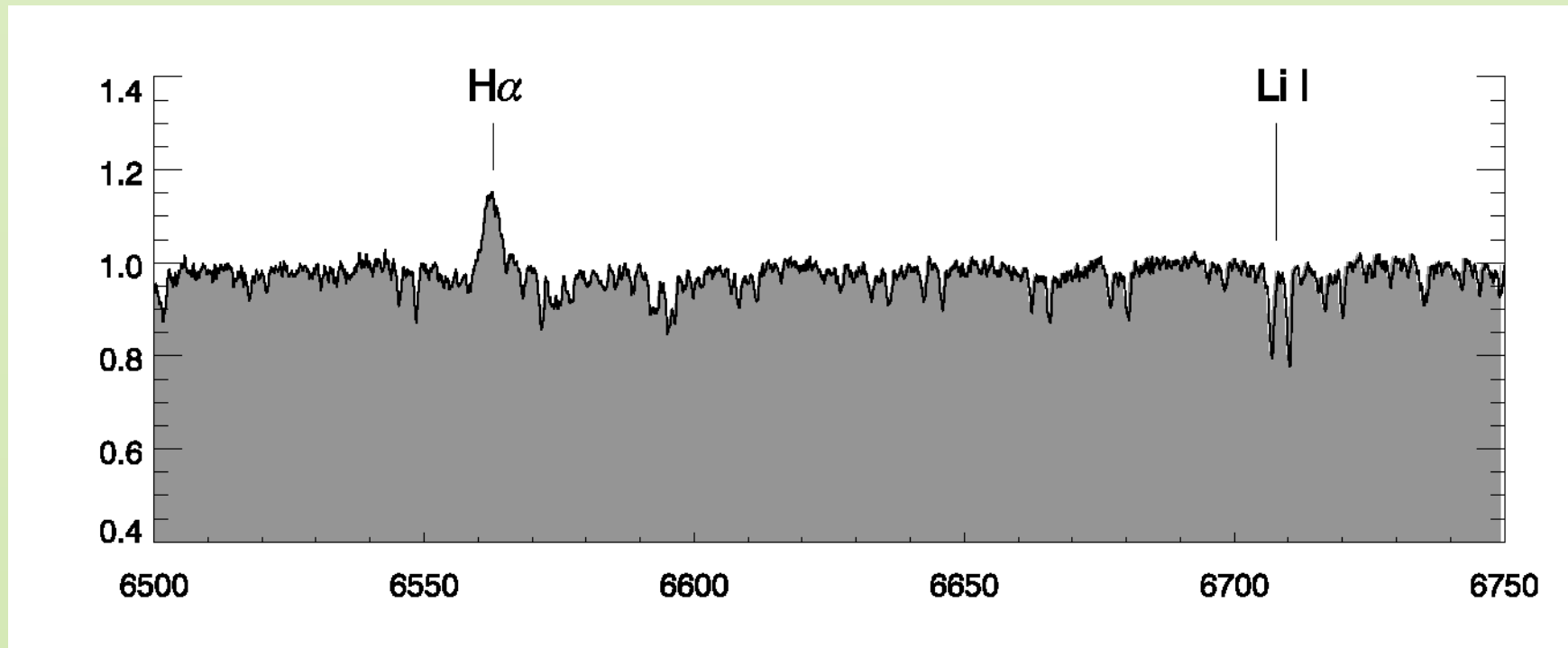
A New Pre-Main-Sequence Eclipsing Binary



A new, double-lined PMS EB was discovered in Orion with the FIES spectrograph (fiber-fed echelle, $R = 47000$) at the 2.5m NOT in January 2007.

This radial velocity curve allows us to estimate the masses of the two components with a precision of $\sim 1\text{-}2\%$.

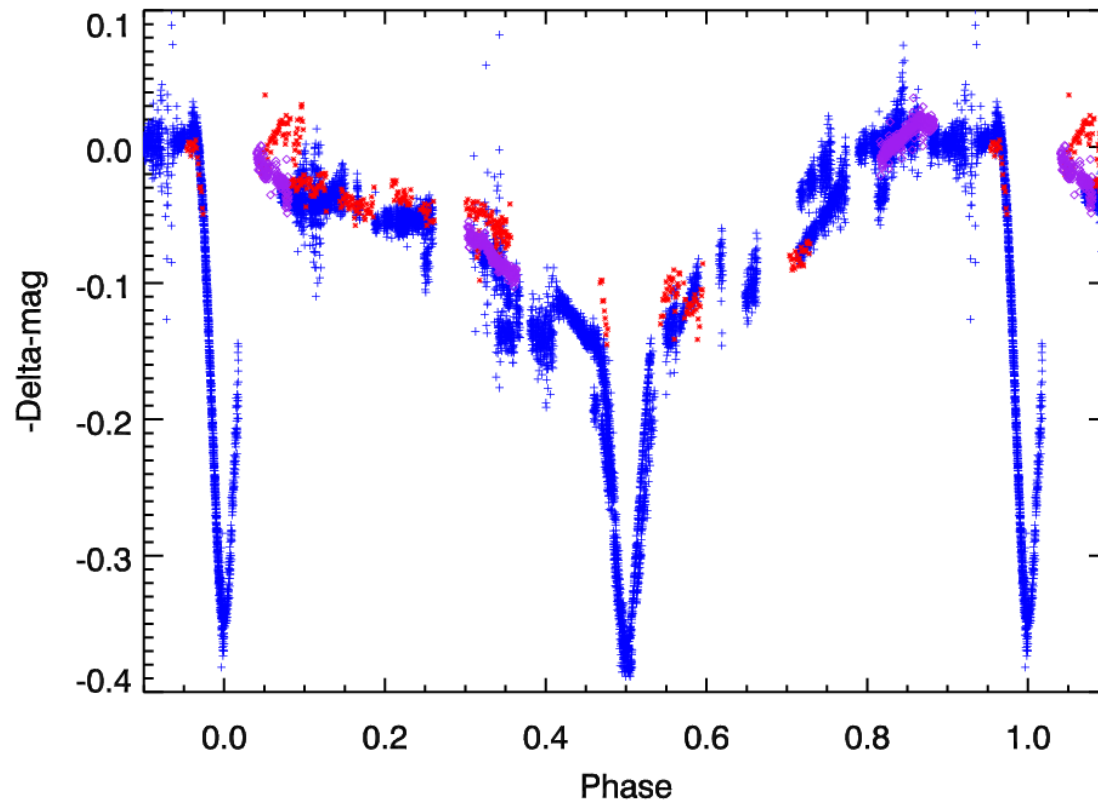
A New Pre-Main-Sequence Eclipsing Binary



The pre-main-sequence nature of this object is confirmed by strong absorption in the Li I 6708 line, as well as by emission in H-alpha.

The strength of the Li line indicates a primordial abundance of Li in this system, $\log n(\text{Li}) = 3.2$.

A New Pre-Main-Sequence Eclipsing Binary

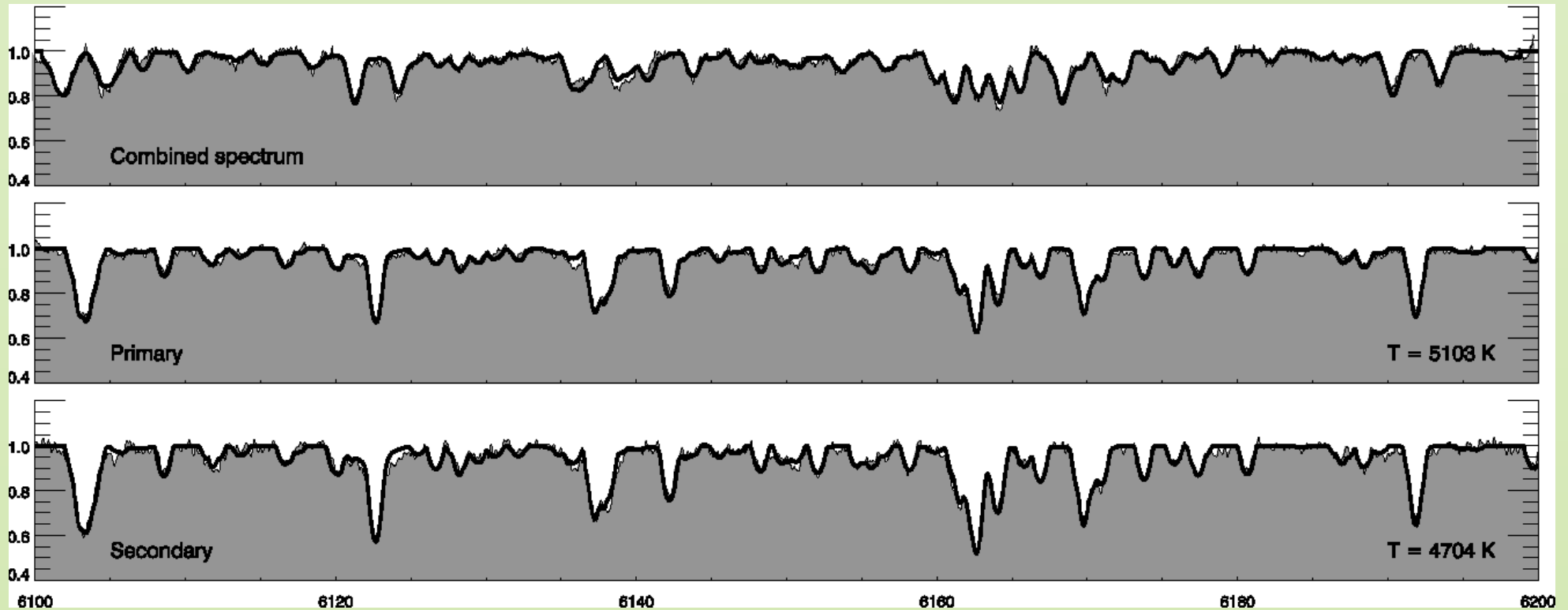


Additional photometry reveals a heavily spotted star, with narrow deep eclipses.

This lightcurve, combined with spectral synthesis and the earlier determined masses, makes it possible to accurately constrain the effective temperatures and radii of the two components.

New Mexico State University (US)
3-mirror telescope (Cambridge, UK)
James Gregory telescope (St Andrews, UK)

A New Pre-Main-Sequence Eclipsing Binary

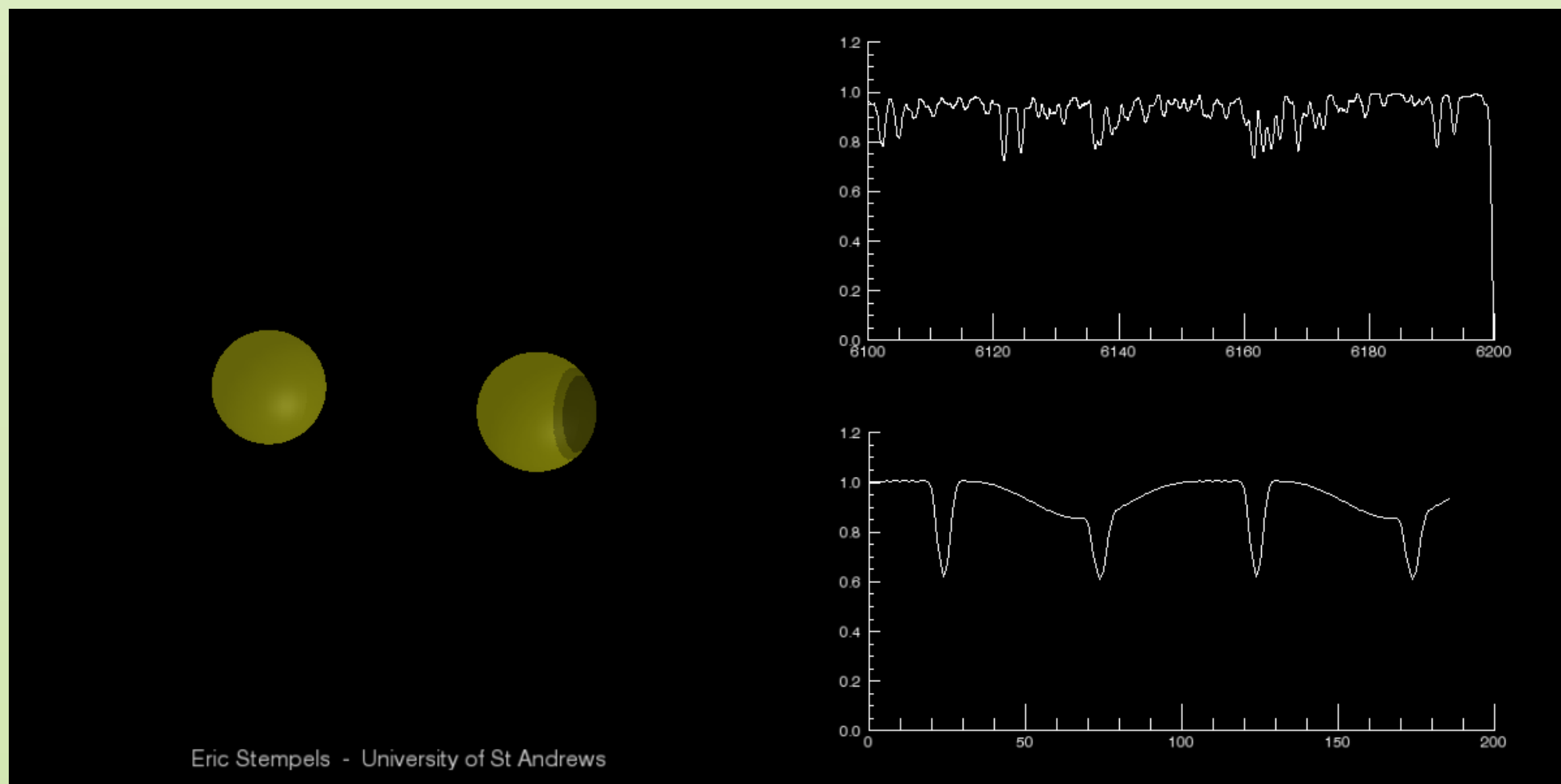


Tomographic separation allows to determine the fundamental stellar (atmospheric) parameters of the individual stars.

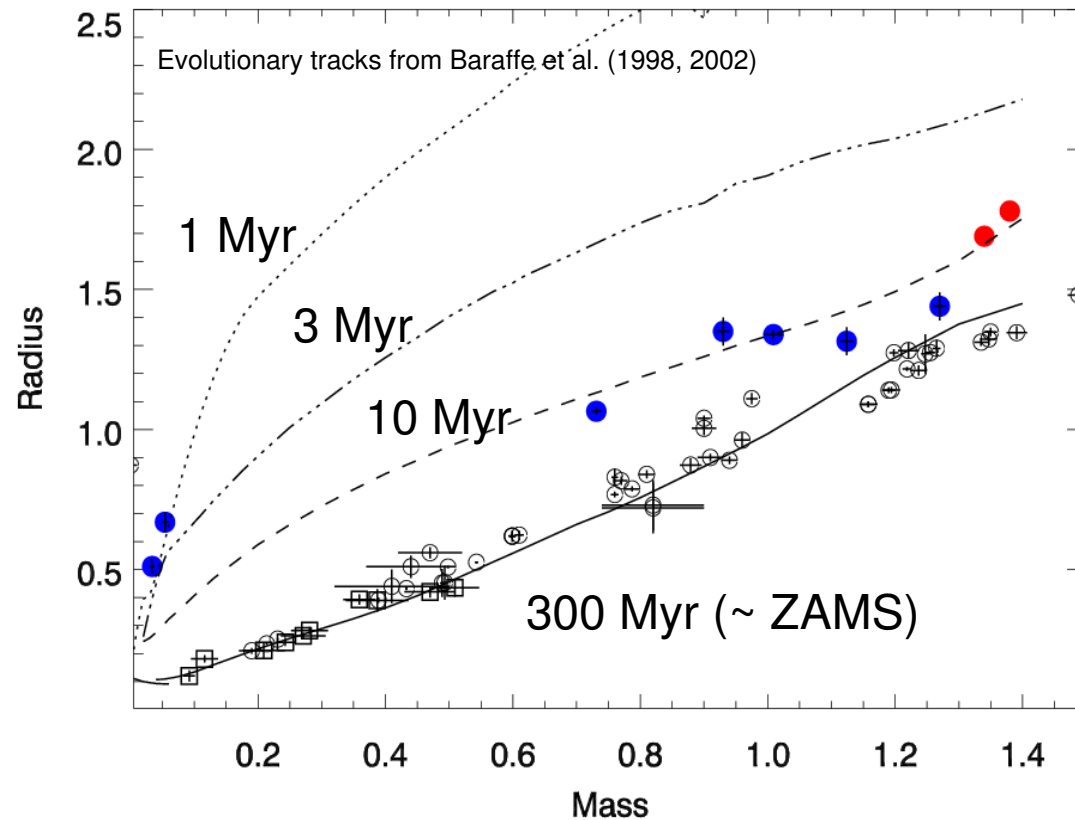
$$T (\text{primary}) = 5100 \text{ K}$$

$$T (\text{secondary}) = 4700 \text{ K}$$

A New Pre-Main-Sequence Eclipsing Binary



A New Pre-Main-Sequence Eclipsing Binary



New PMS EB

Previously known PMS EBs.

(Covino et al. 2004; Stassun et al. 2004, 2006).

Other EBs with measured masses and radii (Andersen 1991;
Hillenbrand & White 2004; Lopez-Moralez et al 2006, and refs.)

Age ~ 11 Myr

Distance ~ 300 pc

T(prim) 5100 K

T(sec) 4700 K

M(prim) 1.34 M_{sun}

M(sec) 1.38 M_{sun}

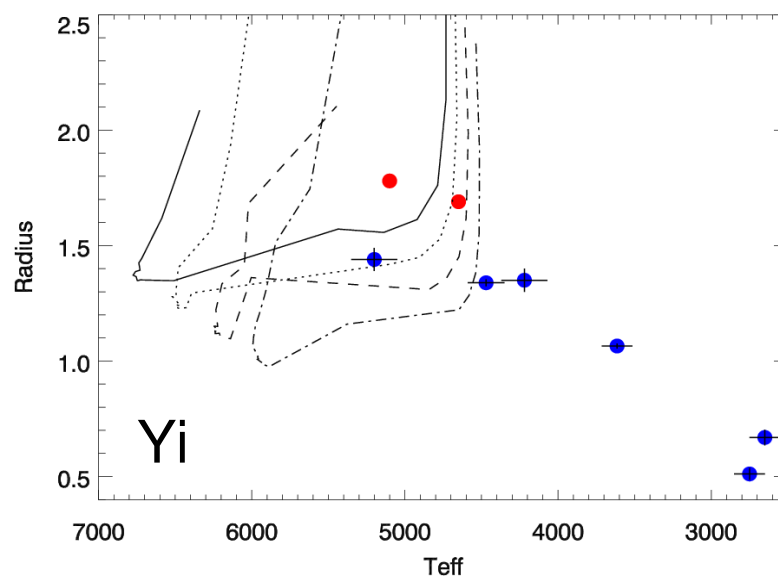
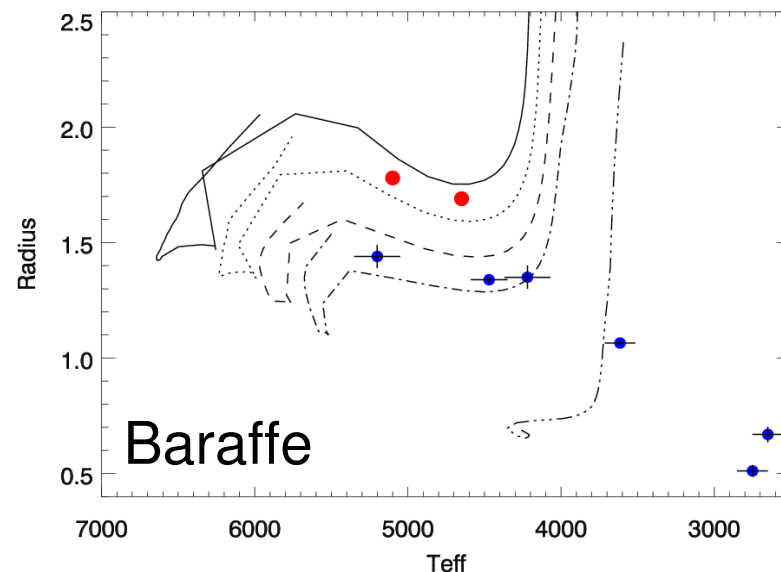
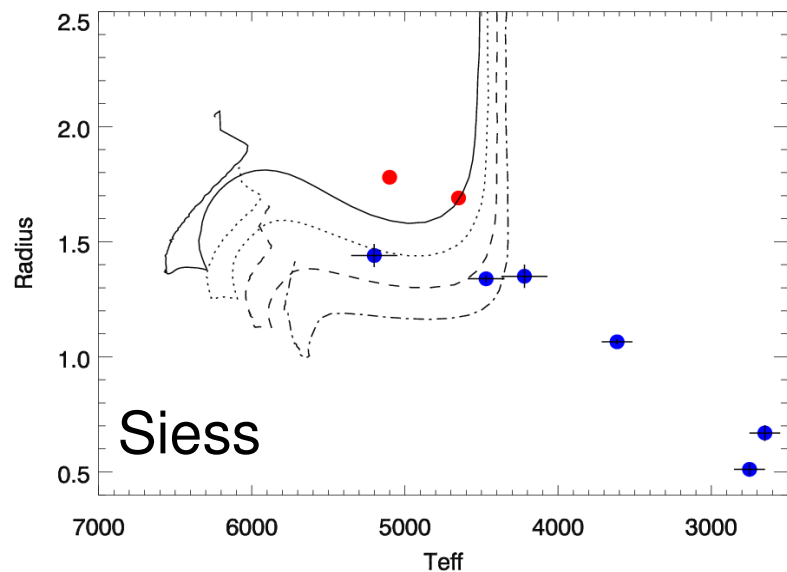
R(prim) 1.69 R_{sun}

R(sec) 1.78 R_{sun}

log n(Li) 3.2

EW(Ha) 1.0 Å

A New Pre-Main-Sequence Eclipsing Binary



A New Pre-Main-Sequence Eclipsing Binary

