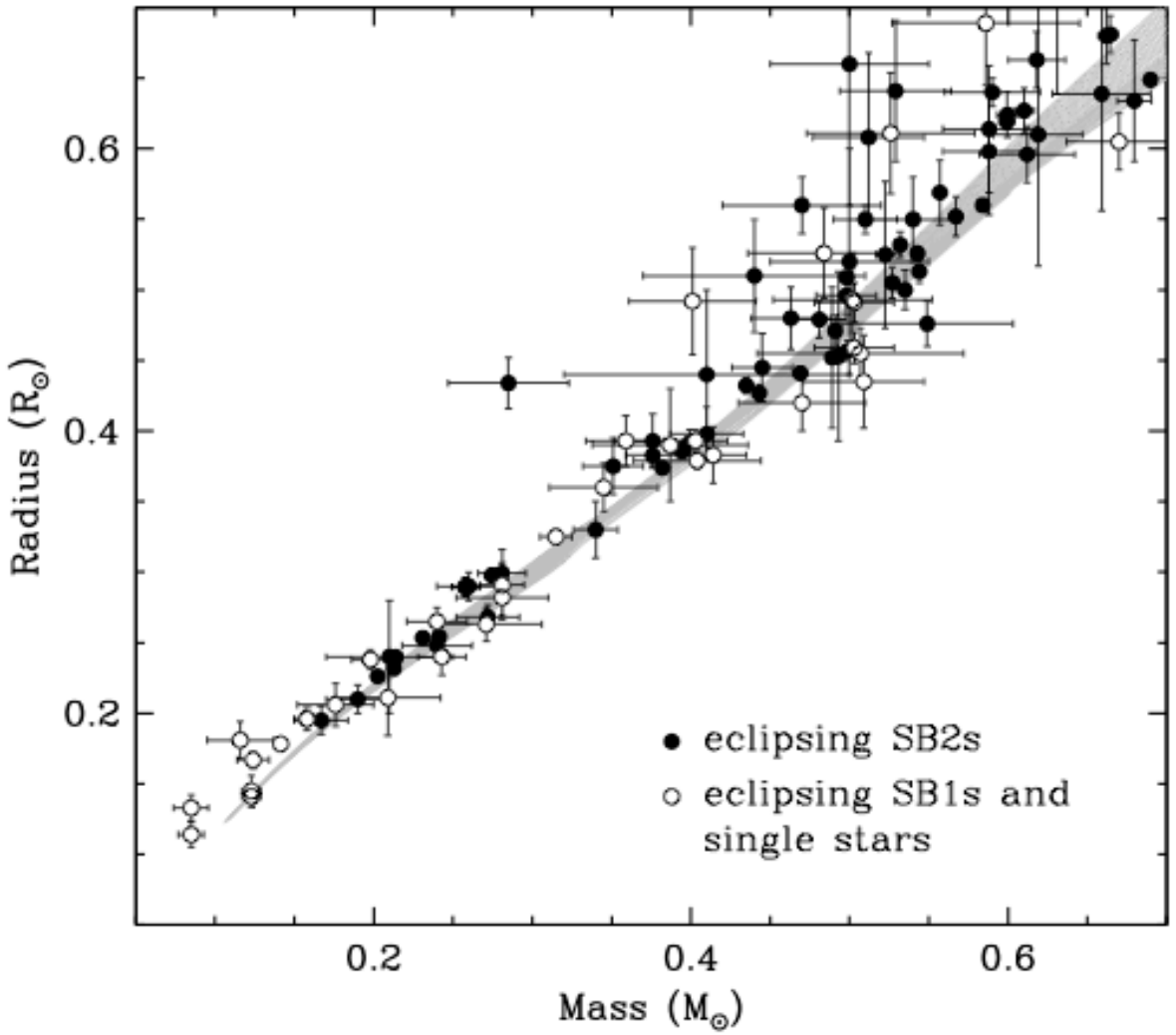
Revisiting the Mass-Radius relation using SOPHIE and the CoRoT planet search survey

Guillaume Montagnier (IAP / OHP)

J.-M. Almenara, R. Dìaz, G. Bruno, F. Bouchy, M. Deleuil, G. Hébrard, C. Moutou, A. Santerne, A. Triaud et al

Mass-Luminosity relation



Torres et al 2012

Goal and target selection

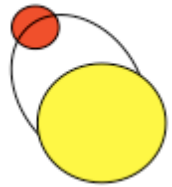
- Goal: measure mass and radius of low mass transiting binaries.
- Targets:
  - Selection in CoRoT transiting planet candidates.
  - Targets already followed-up with RV.
  - V<15
  - m2 < 0.3 Ms

=> 31 targets observed in a specific SOPHIE program

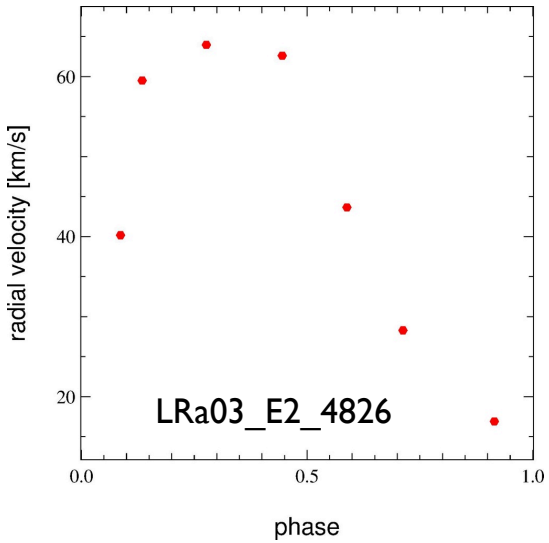
False positives: massive and giant primaries

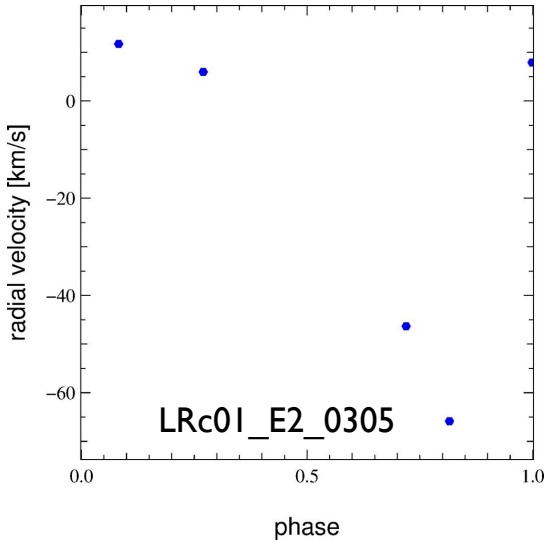
- Spectral analysis by G. Bruno and M. Deleuil at LAM (SME and SWA methods).
- Massive primaries:
  - LRc02_E1_0981: Teff~5500K, log g~2.4, M~7Ms
  - lRa01_E2_2430: super-giant star.
  - SRa02_E2_0486: Teff~5700K, log g~3.3, M~4Ms
  - SRa02_E2_0893: Teff~6500K, log g~2.5, M~7Ms

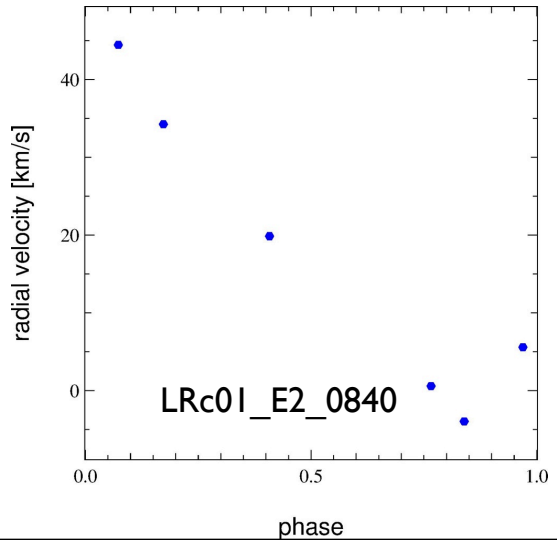
False positive: Secondary-only eclipsing binaries

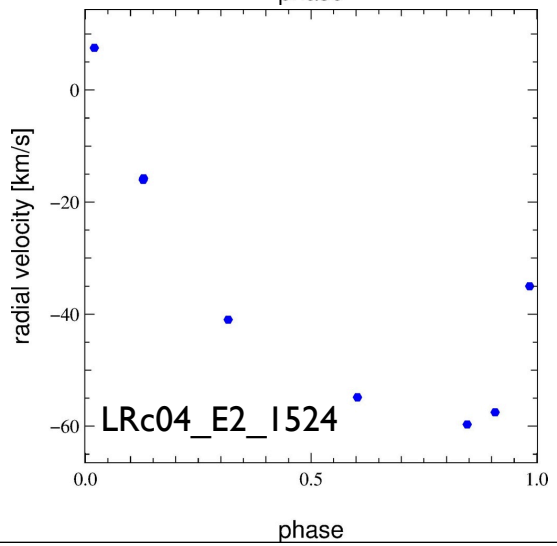


- Only secondary eclipses were observed for: LRc01_E1_1090, LRc01_E2_0305, LRc01_E2_0840, LRc04_E2_1524 and LRa03_E2_4826

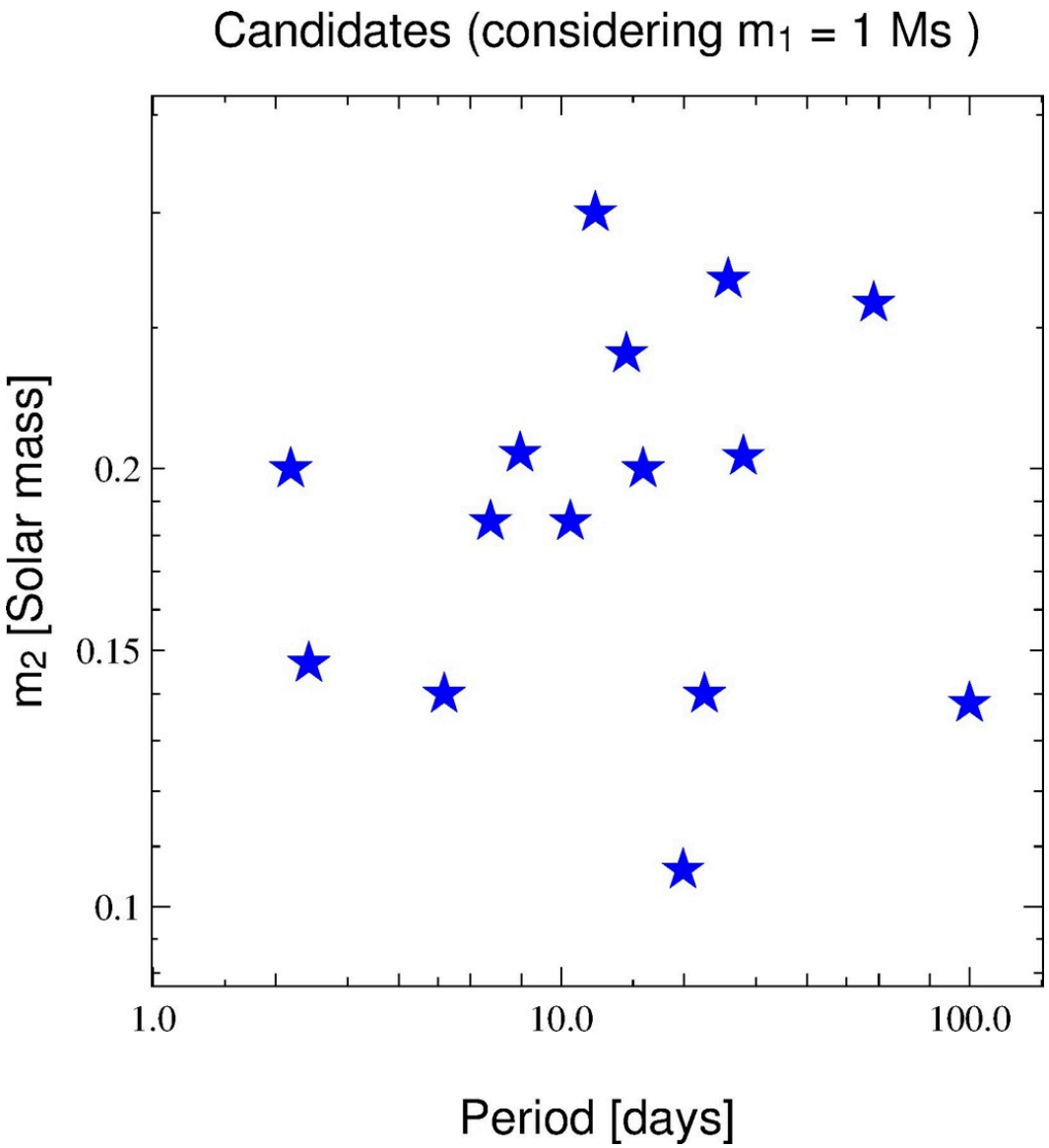




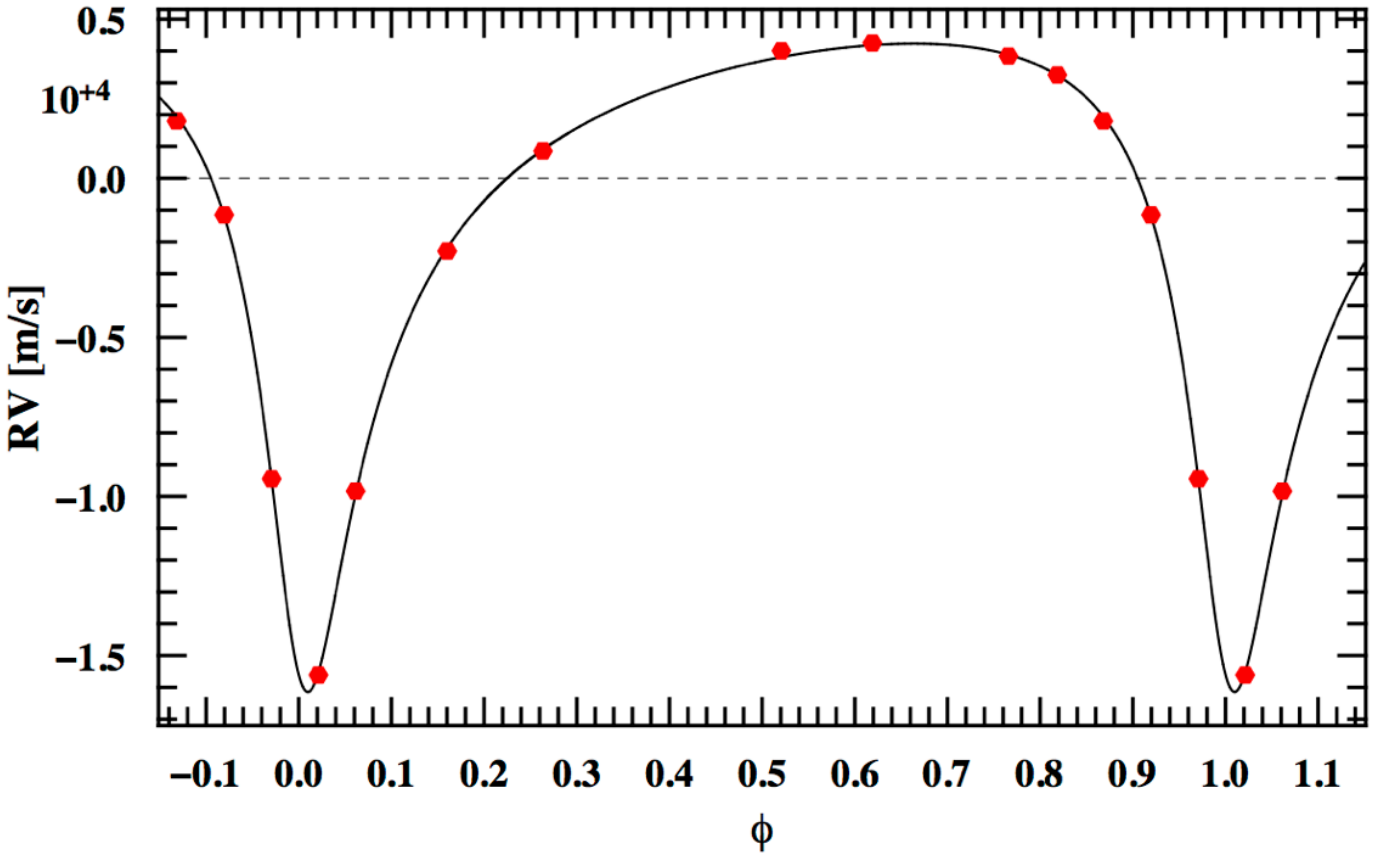




Overview of remaining candidates

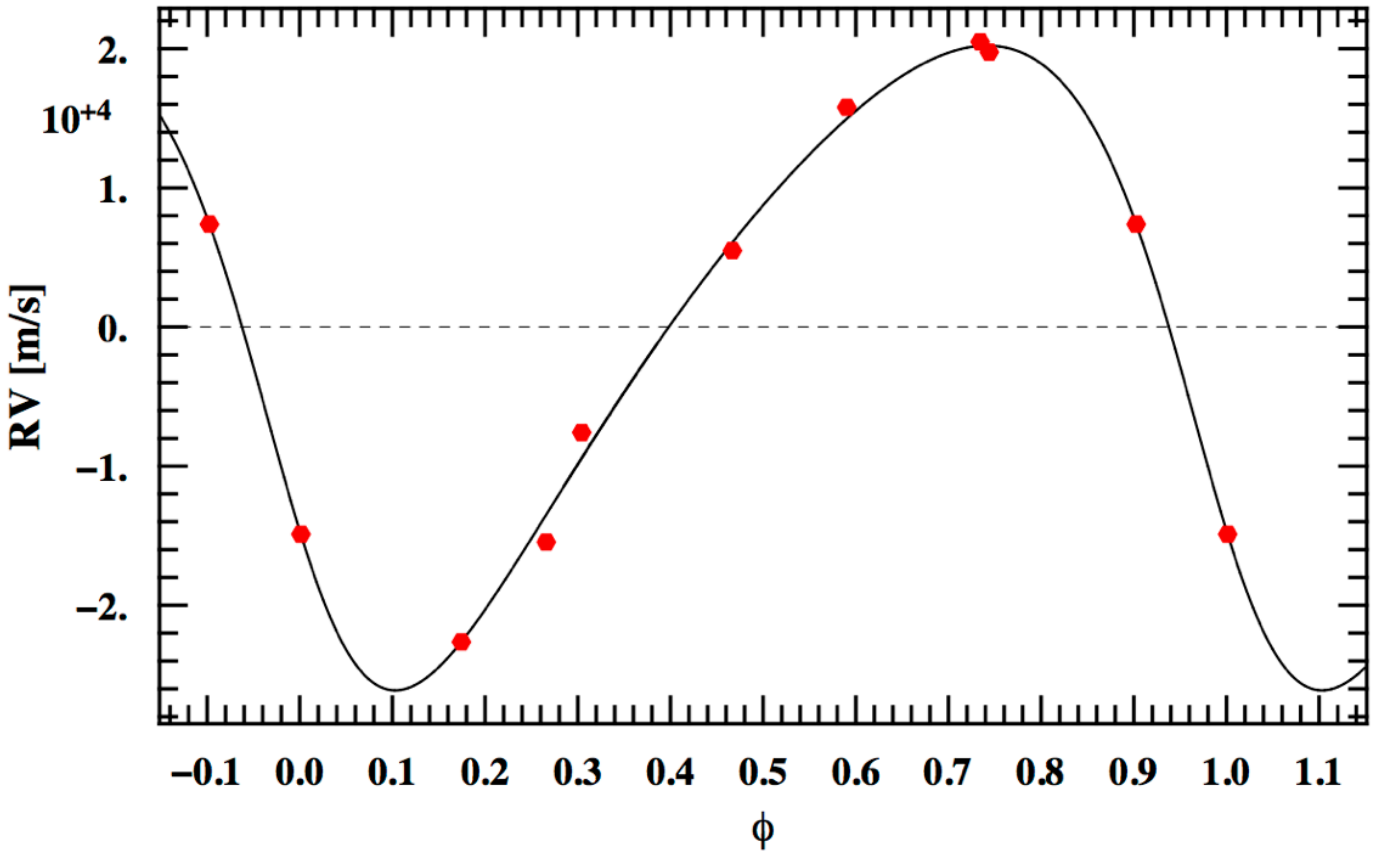


Examples



LRc09_E2_0548, m2=0.106 Ms, P=19.9 day, e=0.6
(spectral characterization on going)

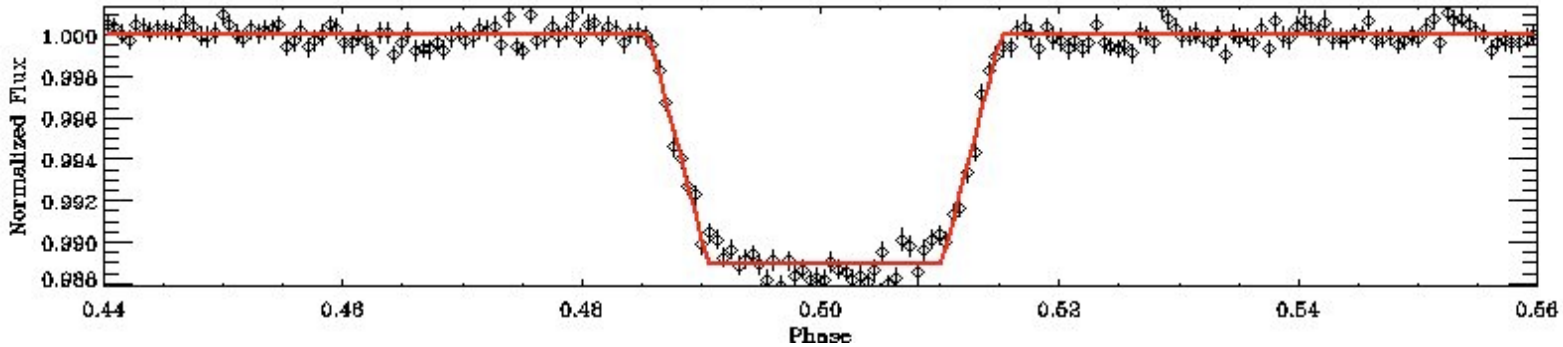
Examples



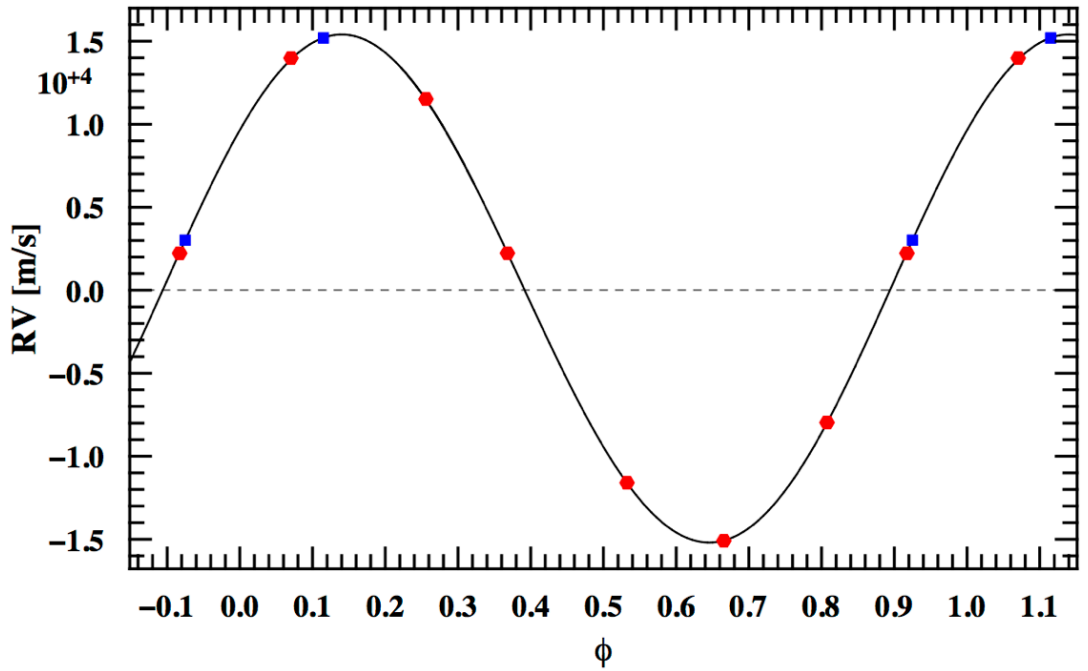
SRa04_E2_0335, m2=0.145 Ms, P=2.4 day, e=0.25
(spectral characterization on going)

LRc02_E2_1207

Primary: Teff=6650 +/- 70 K, log g=4.20 +/-0.11, [Fe/H]~0.6
m1=1.39 +/- 0.08 Ms, R=1.43 +/- 0.3 Rs

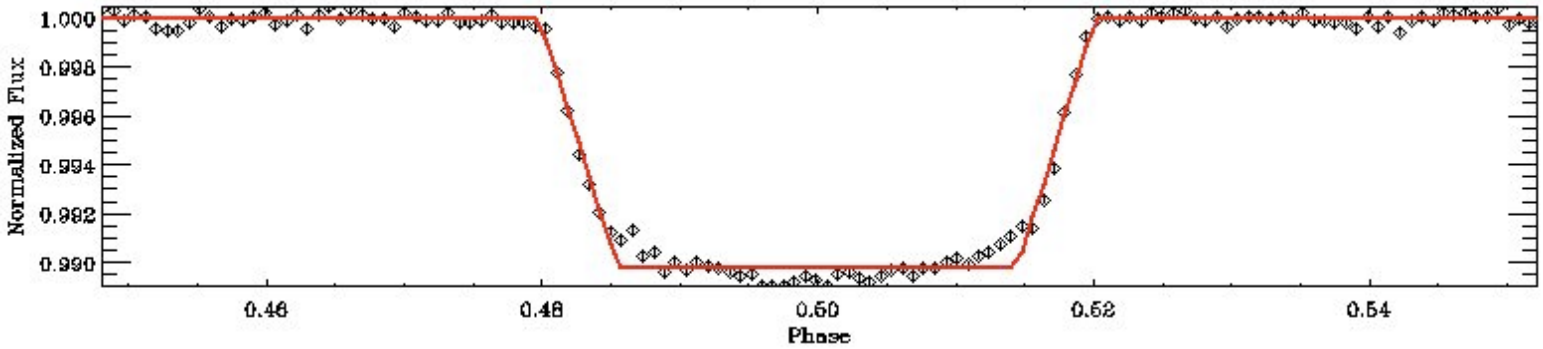


R2=0.18 +/- 0.03 Rs
m2=0.18 +/- 0.01 Ms

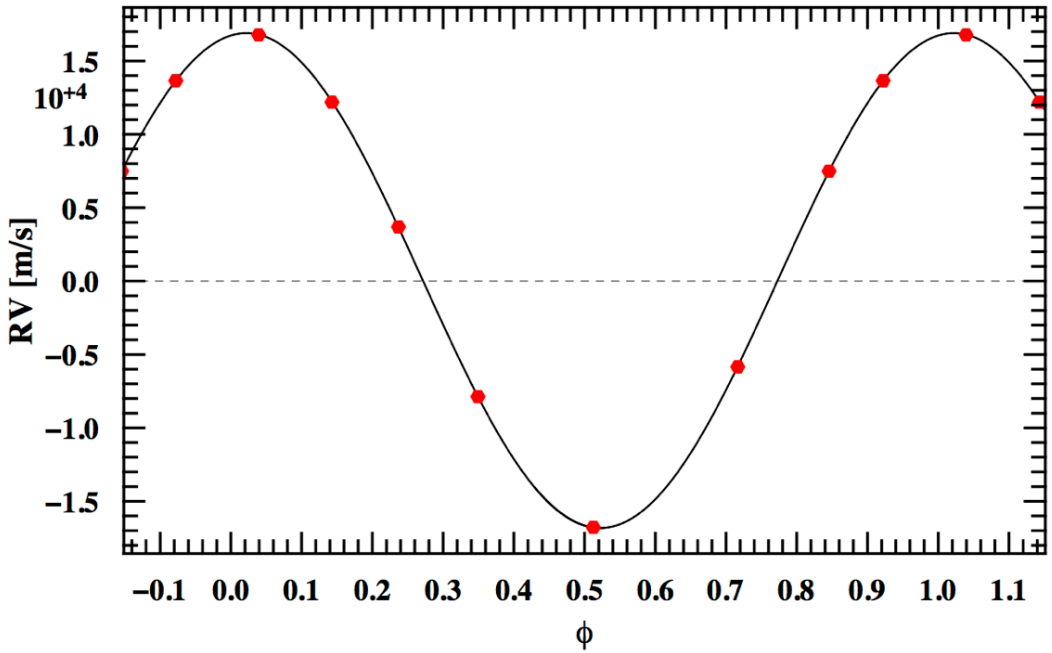


LRa03_E2_0269

Primary: Teff=6000 +/- 100 K, log g=3.9 +/-0.2, [Fe/H] =0
m1=1.27 +/- 0.1 Ms, R=2.0 +/- 0.37 Rs



R2=0.20 +/- 0.03 Rs
m2=0.205 +/- 0.01 Ms



Mass-Radius relation for low mass stars

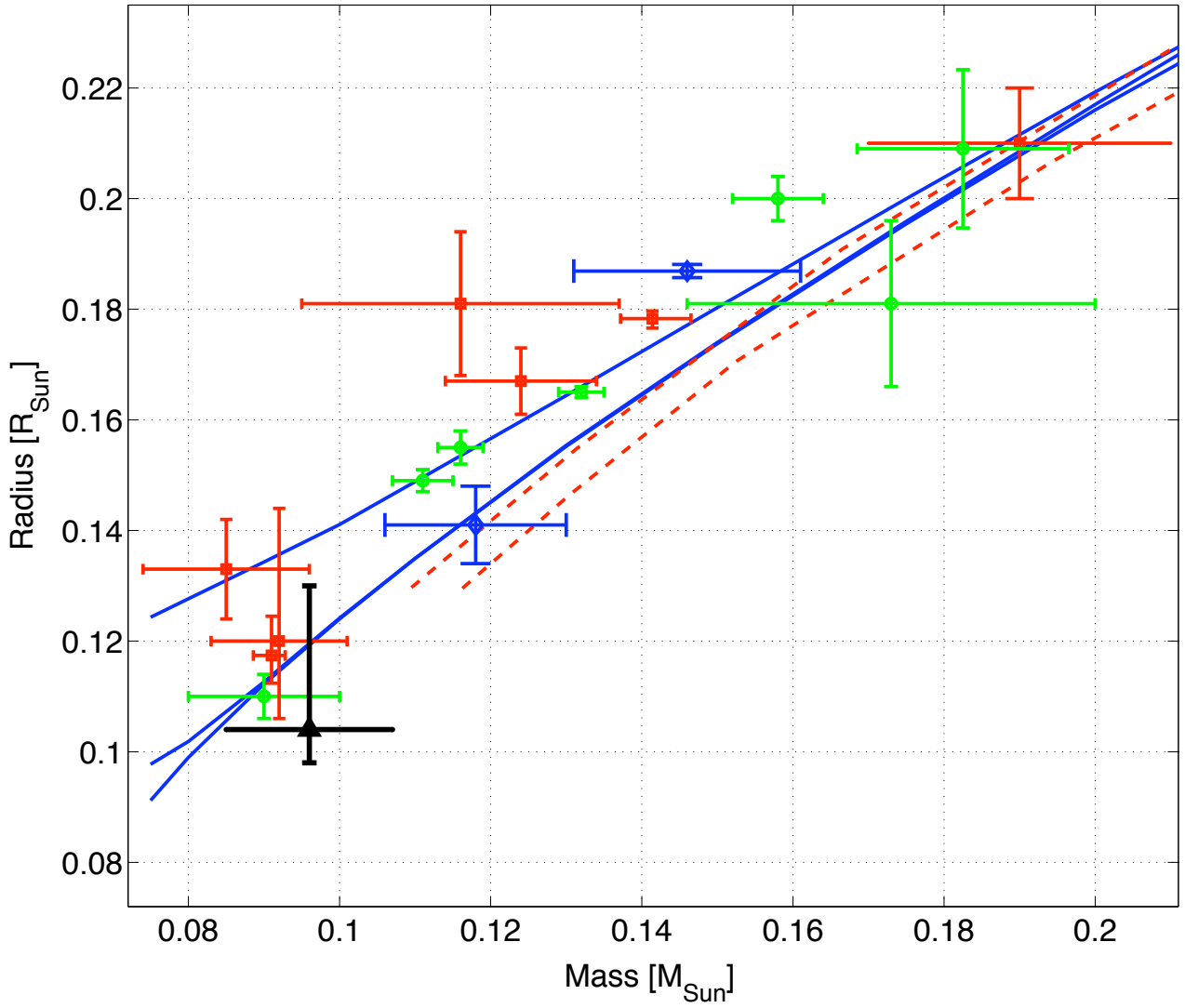


Figure from Tal-Or et al 2013

Mass-Radius relation for low mass stars

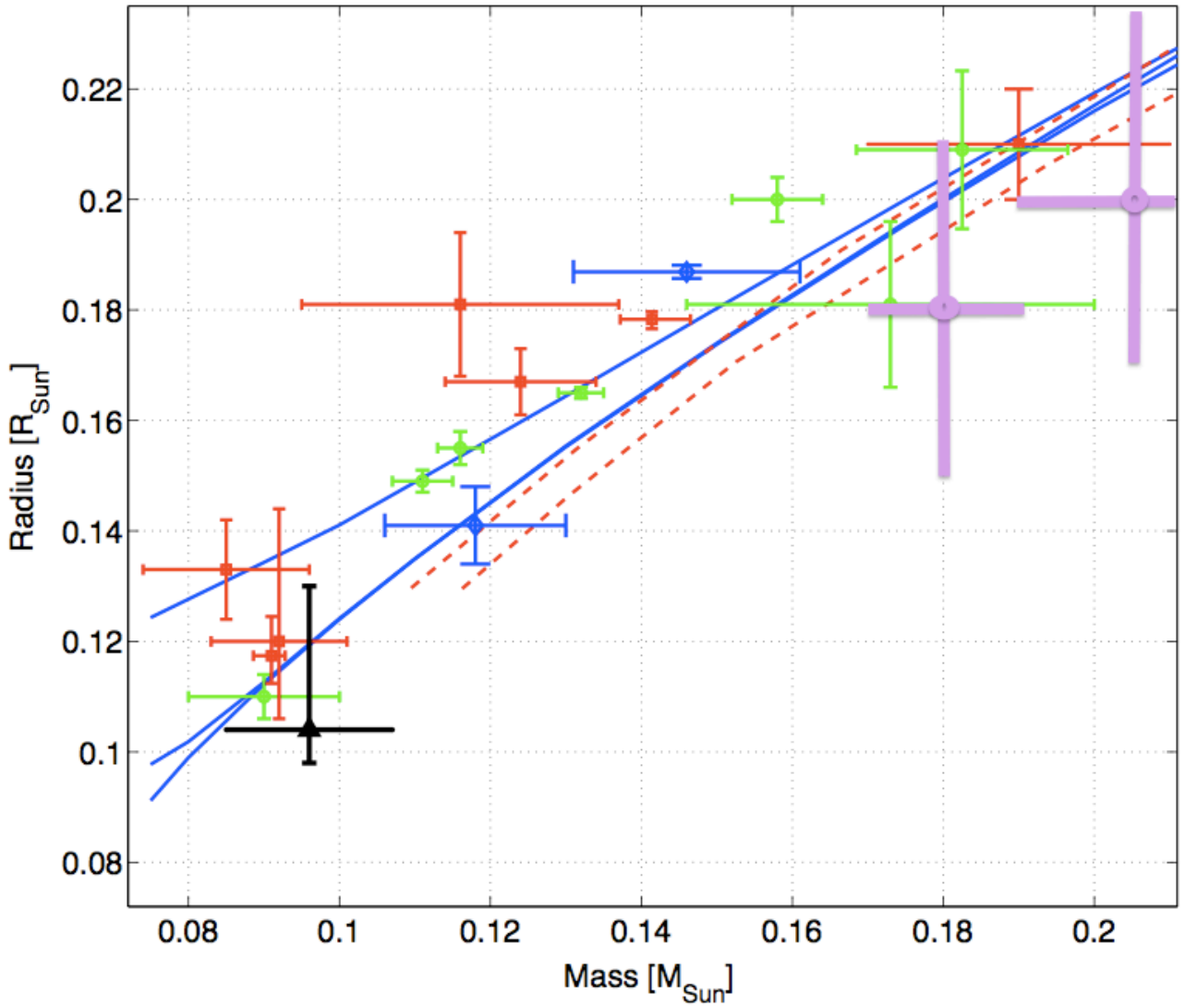


Figure from Tal-Or et al 2013