Light curve and orbital period analysis of the eclipsing binary AT Peg

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Aims

- Accurate light curves derivation
- Components' absolute parameters & evolutionary status determination
- Investigation for tertiary component
- Interpretation of the orbital period changes
- Search for pulsations

Observations & data reduction

- **Telescope:** 20 cm Newtonian reflector
- **CCD:** ST-8 XMEi – B & R photometric filters (Bessell)
- **Location:** University of Athens Observatory
- **Method of reduction:** Differential aperture photometry
- **Duration:** Six nights on August 2010

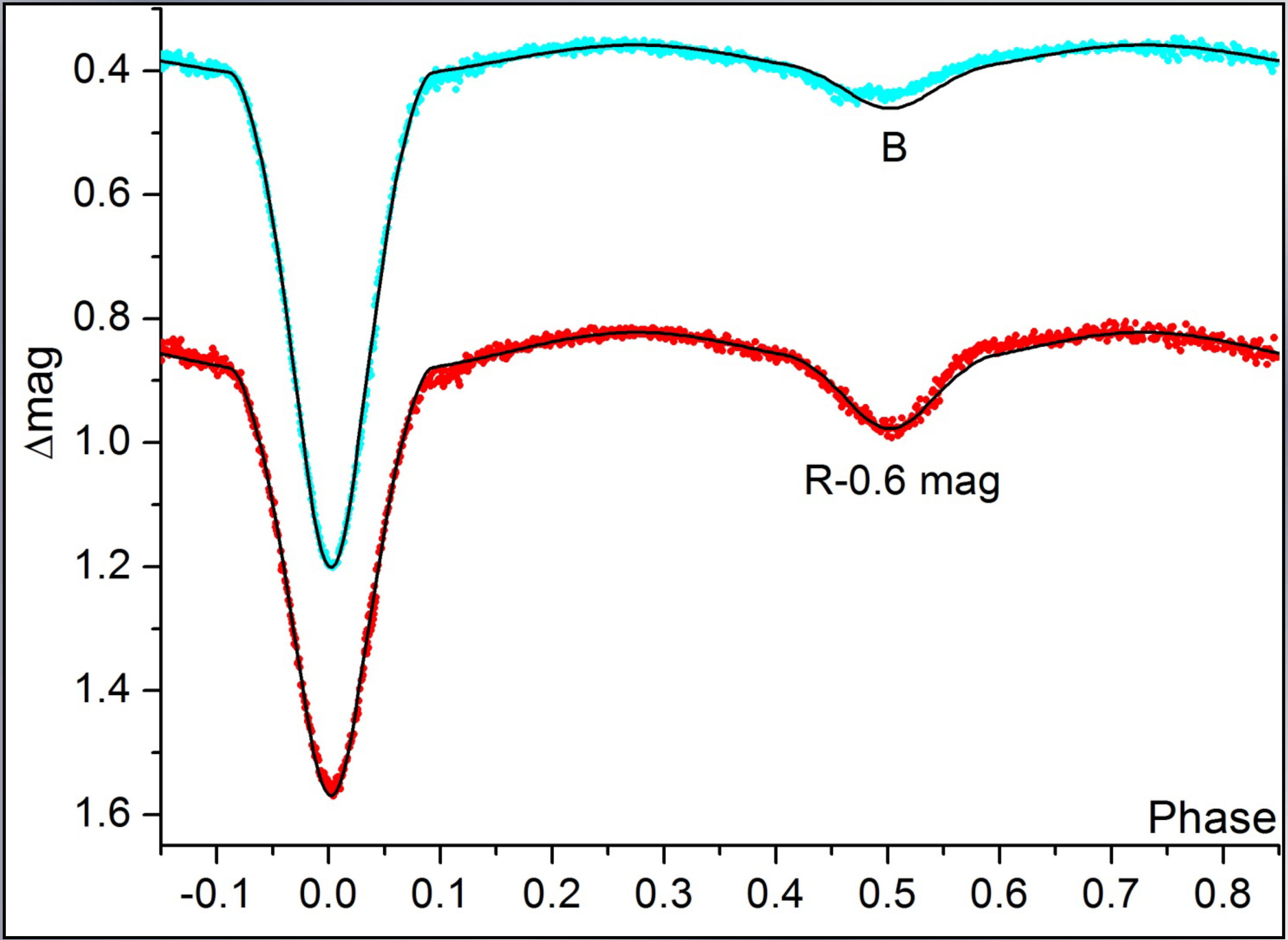
Light curve analysis

Method: Wilson & Devinney code – PHOEBE software

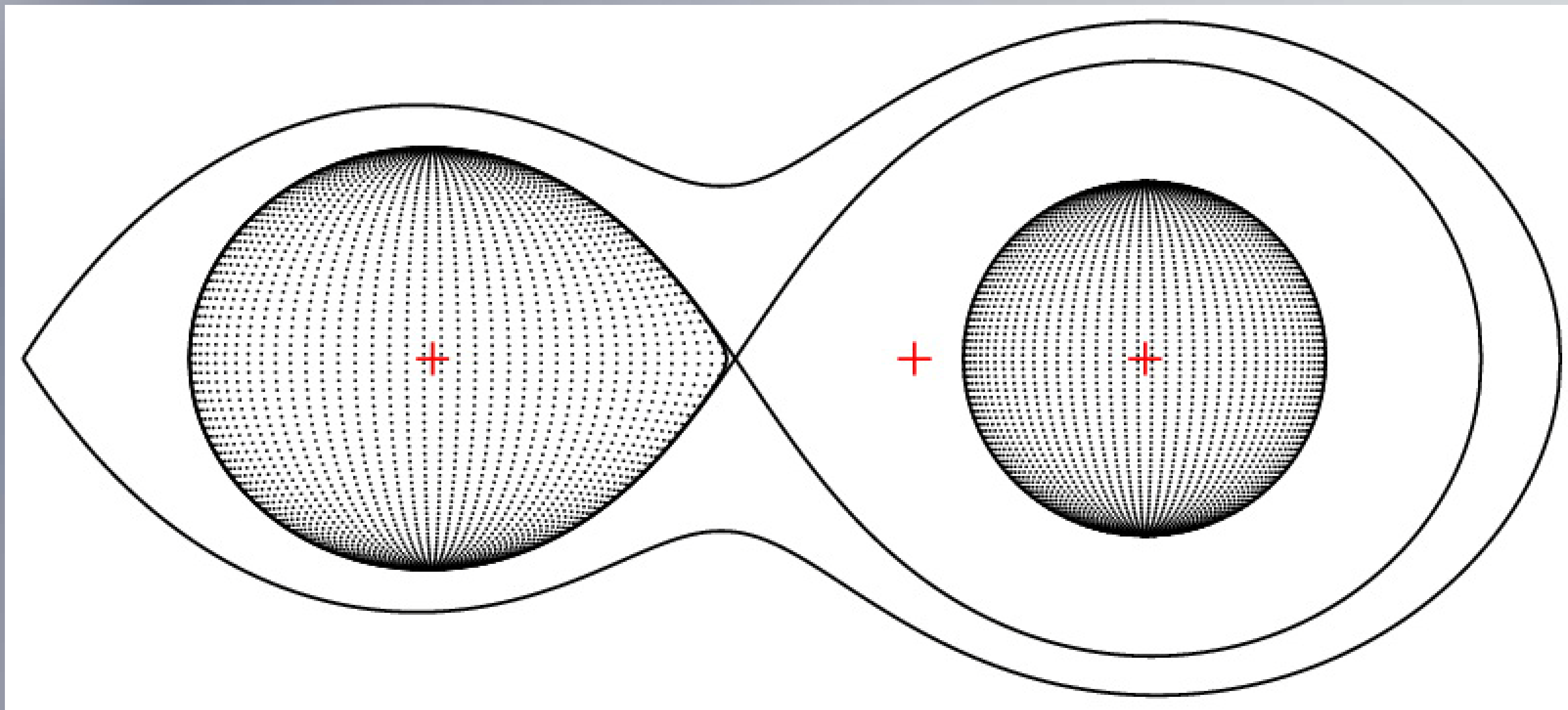
LITERATURE INFORMATION

- Spectroscopic mass ratio = 0.478 (Maxted et al. 1994)
- $T_1 = 8400 \pm 100$ K, $T_2 = 4900 \pm 200$ K (Maxted et al. 1994)

Light curve fitting

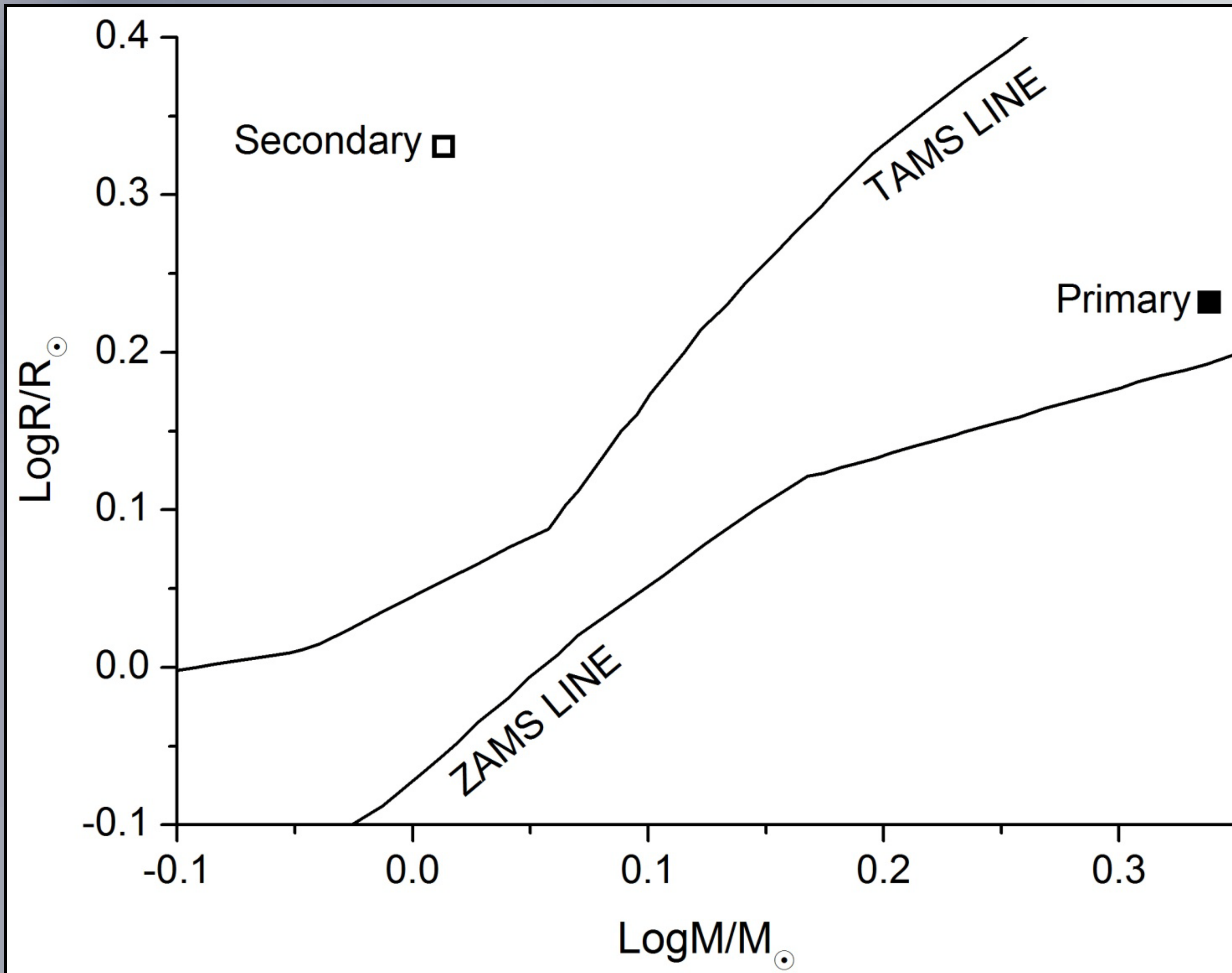


3D Model & Absolute parameters



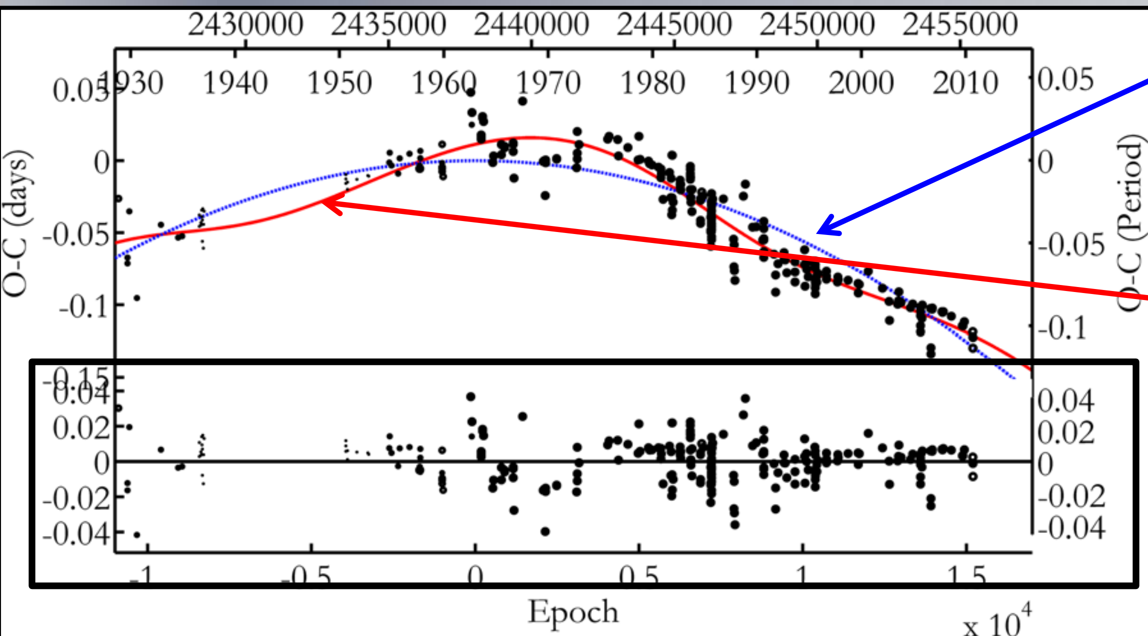
M [$M_\odot$]	1.0 (1)	2.2 (1)
R [$R_\odot$]	2.14 (3)	1.70 (3)
T [K]	5189 (7)	8400
L [$L_\odot$]	3.0 (1)	13.0 (4)
a [$R_\odot$]	4.61 (9)	2.18 (3)
log g [cm/s^2]	3.79 (3)	4.31 (3)

Position of the components in the M-R diagram



Orbital period analysis

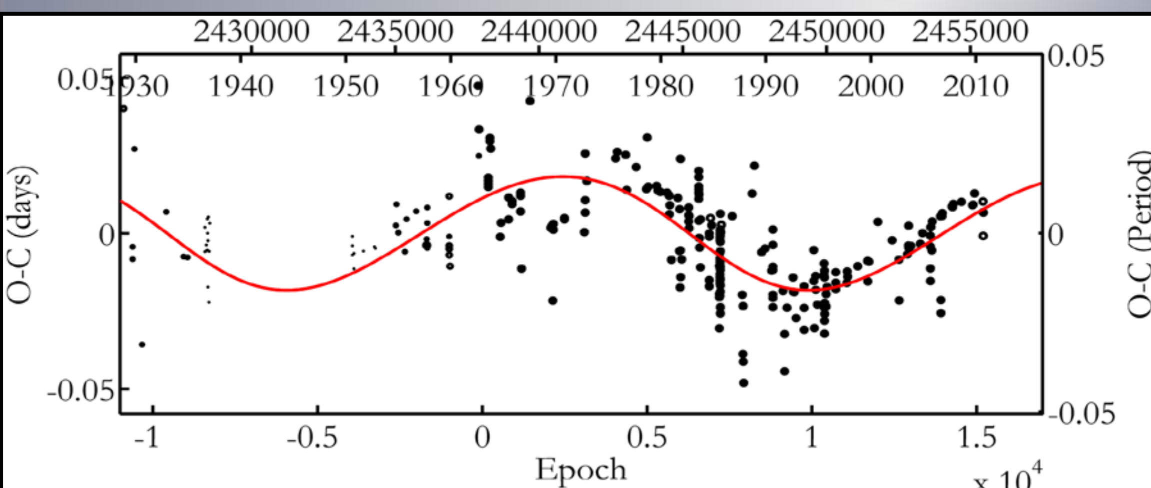
Method: Least squares with statistical weights



Parabola

Total function
LITE+parabola

Residuals



LITE function
(after parabola's removal)

Conclusions

- Conventional Semi-detached system with the primary being a MS star and the secondary at subgiant stage

- No pulsations were detected

- A third light of ~7% was found through the light curve analysis

- A third body with minimal mass of ~0.6 $M_{\odot}$ might explain the cyclic orbital period effects but cannot explain (as a MS star) the observed light contribution

- The orbital period secular change is caused very probably due to more than one mechanisms since its curvature is opposite to the expected one (mass transfer)

- Mass loss from the system (e.g. stellar winds) or systemic angular momentum loss probably superimpose the mass transfer