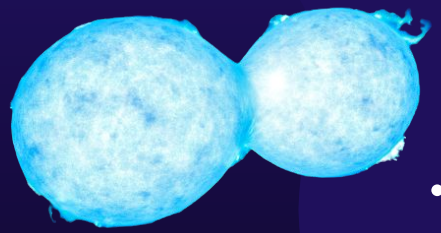
Dynamical stability of B-type Overcontact Systems



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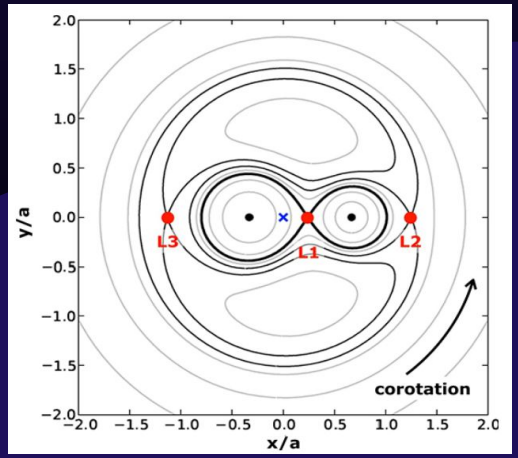
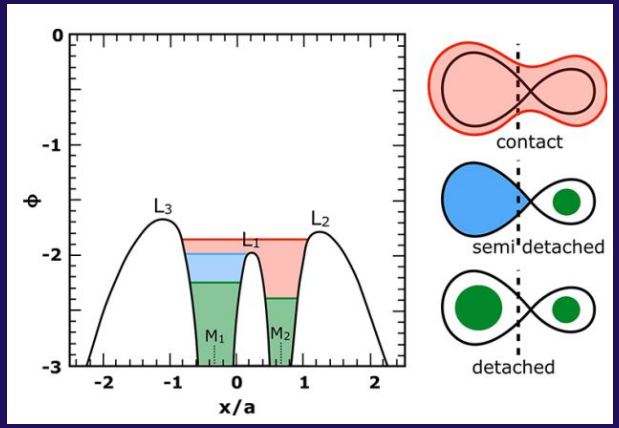
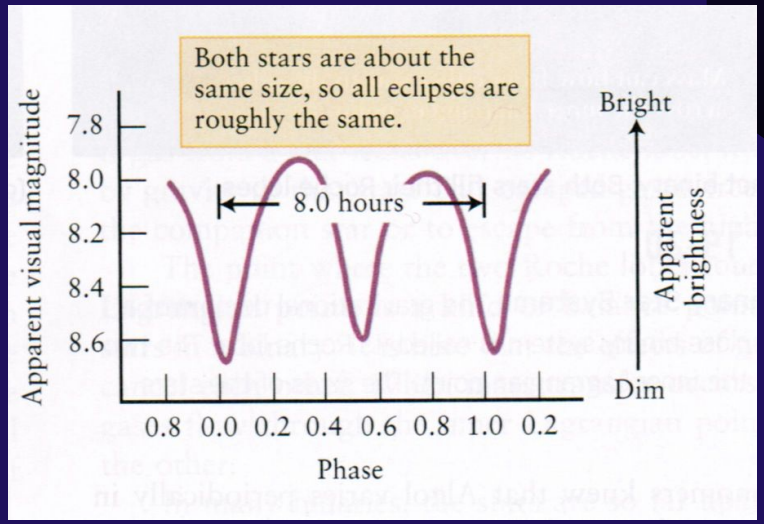
BACKGROUND

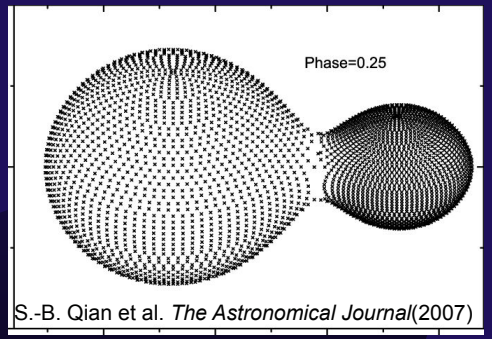
- ***The Roche Model***: Region around a star in a binary system within which orbiting material is gravitationally bound to that star.
- ***Tidal Effects***: Tidal forces can transfer angular momentum between the rotation of the individual stars and the orbit of the system.
- ***Mass Transfer***: Mass transfer is the idea that material can move from one star to another.
- ***The Overcontact Phase***: When both components of the binary systems are overfilling their Roche Lobel, are considered as an Overcontact binary.
- ***Chemically Homogeneous Evolution in Massive Overcontact Binaries***: In overcontact systems they be benefit from the very large angular momentum reservoir from the orbit to help maintain the high rotation rates.





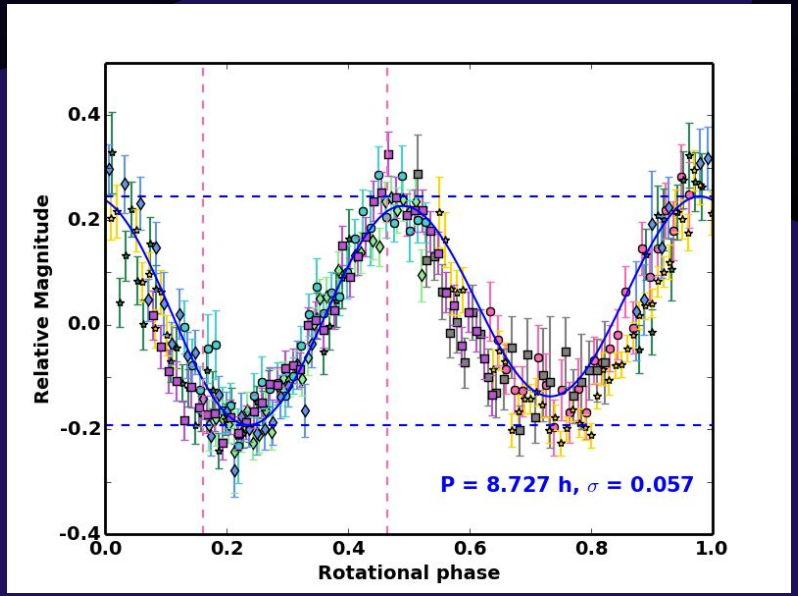
Why this is important ?



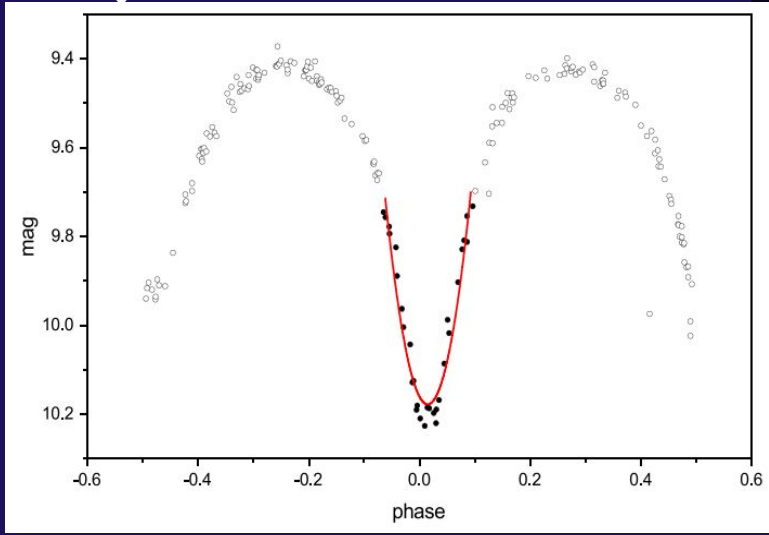


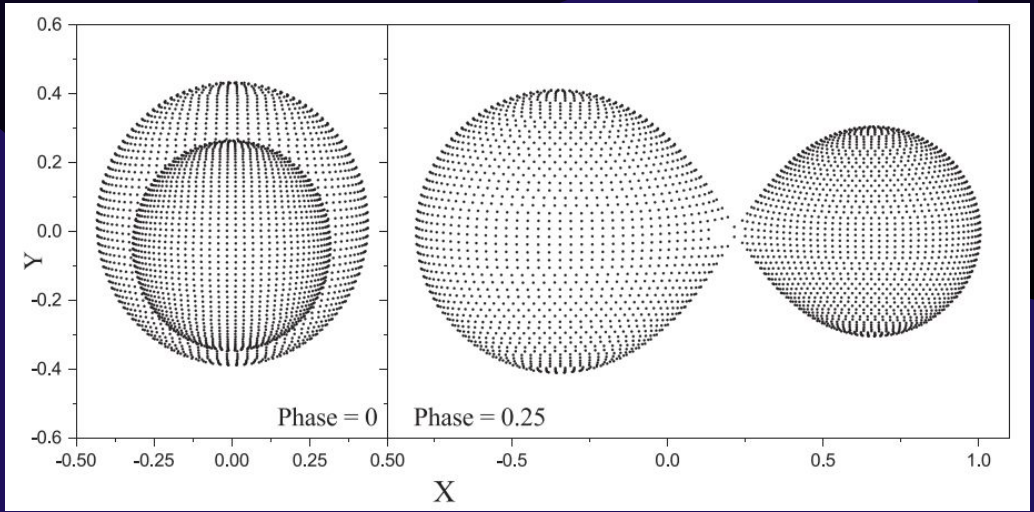
S.-B. Qian et al. *The Astronomical Journal*(2007)

How to determine Period ?



V606 Cen

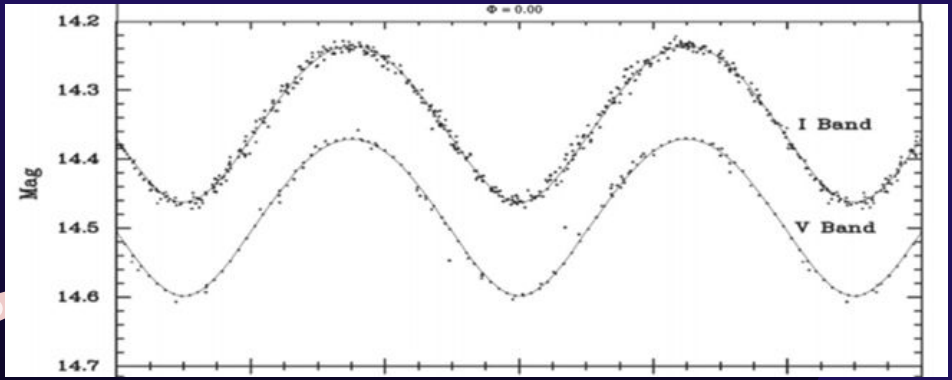


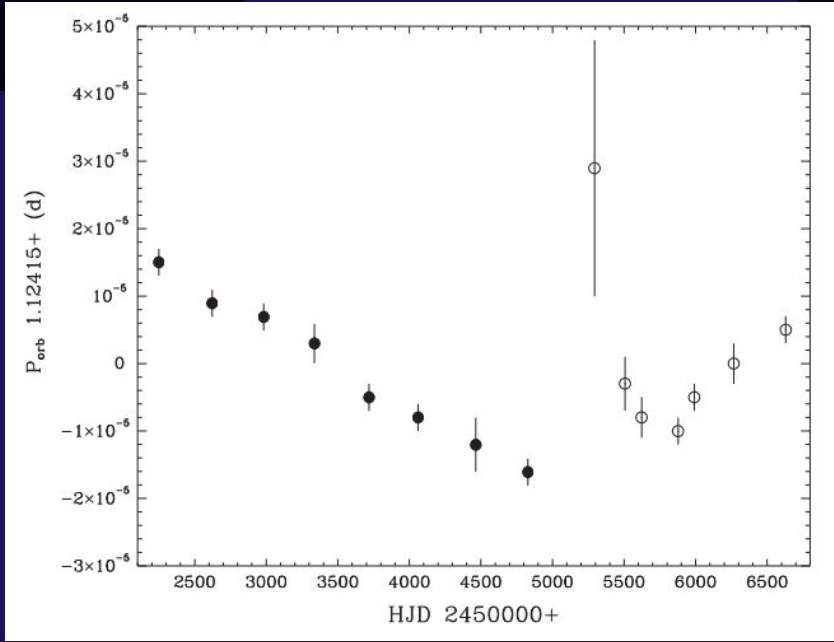


Parameters	Eccentric Orbit Case	Circular Orbit Case
Orbital Period, P (yr)	88.3(1.9)	85.9(1.3)
Rate of the period change, dot{P}(day yr^{-1})	-2.08(0.07)10-7	-2.22(0.06)10-7
	Complete Data	TESS Data
q (M2/M1)	0.54845(0.00074)	0.57434(0.0025)

VFTS352

Parameters	
Orbital Period, P (yr)	1.124152
Rate of the period change, dot{P}(day yr-1)	-0.050.10
q (M2/M1)	0.98
M2	25.1
M1	25.6
Period (days)	1.120

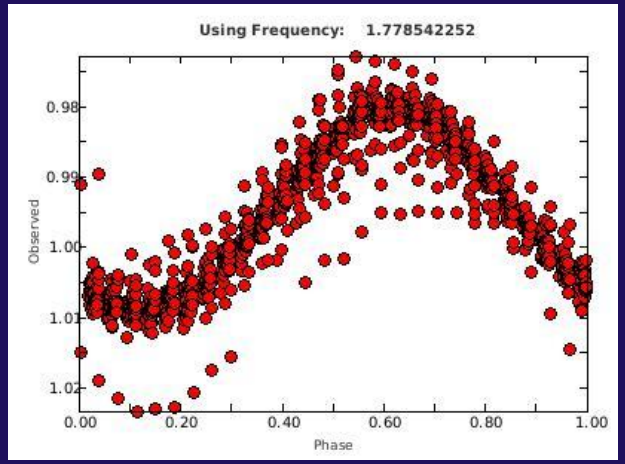


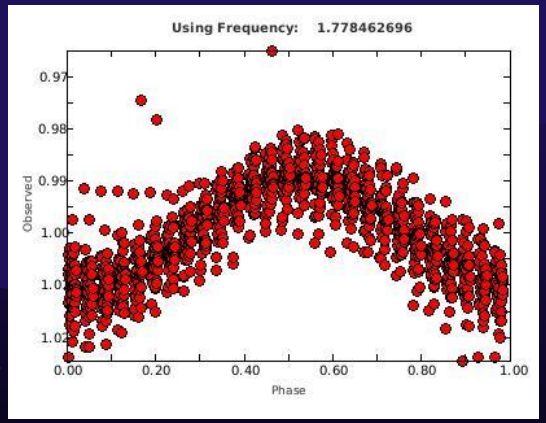


Almeida, L. A., Sana, H., Mink, S. E. D. 2015, The Astrophysical Journal, 812 (The Astrophysical Journal), 102

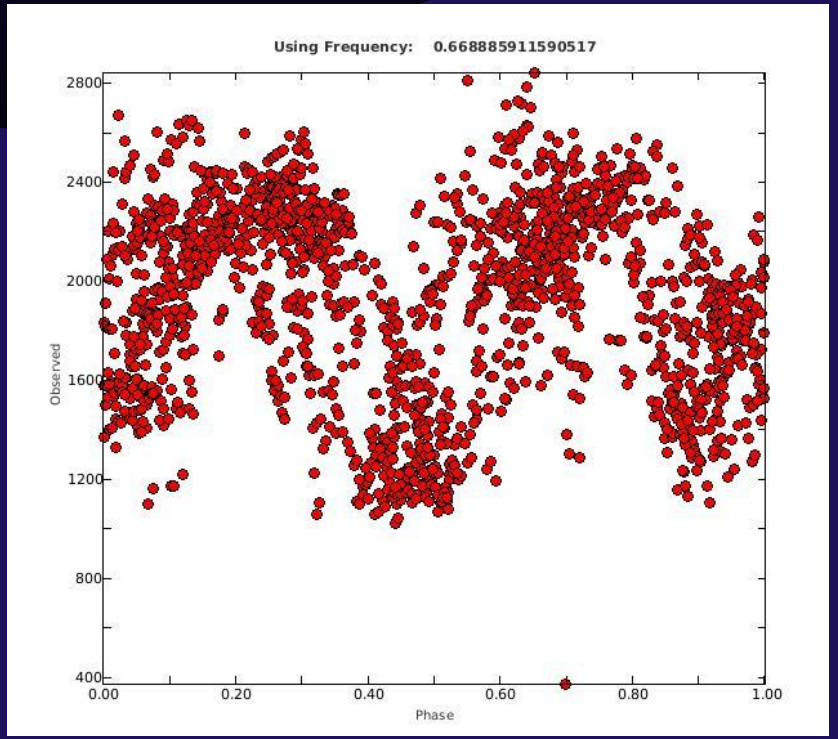
Results

Using Period04 for plot the Light Curves of VFTS352





Using Period04 for plot the Light Curves of V606 Cen



Orbital period of 1.4950935 days.When do 1/1.49=0.6711.approximately light curves are obtained

Conclusions

- Several systems have period changes suggesting that they are evolving towards a lower mass ratio.

- That being said, these findings may suggest that the observed overcontact binaries are originating from systems with longer initial periods

- We have performed a period stability study of known O+O type overcontact systems. Using archival photometric data and the software package PERIOD04, we calculated the periods of the systems over a time span of tens of years. For each system in our sample, we determined the rate at which the period is changing via a linear regression through the period measurements of each data subset.

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