

Stellar astrophysics

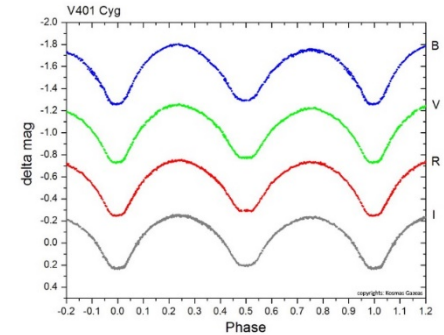
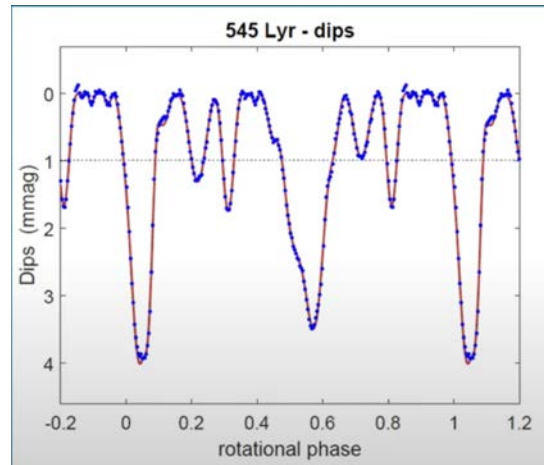
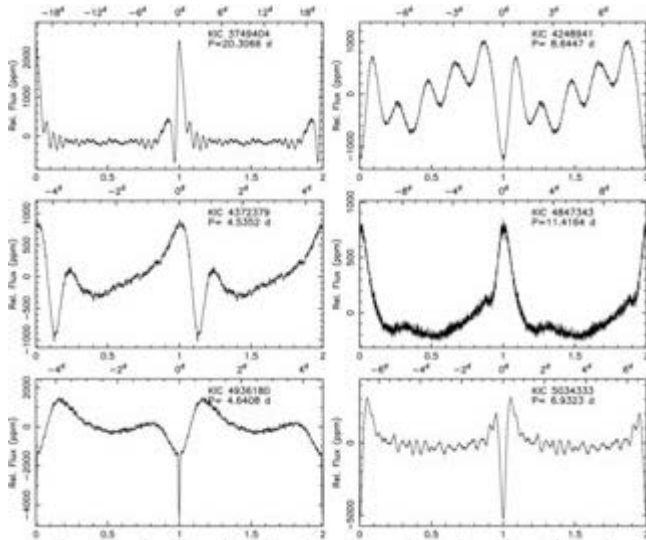
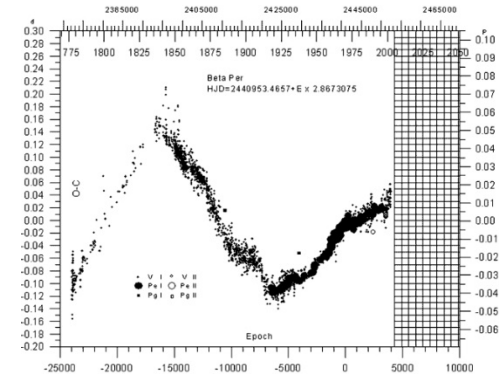


Satellite observations => new challenges

Old and new phenomena are now visible

- heartbeats stars – forced pulsations in eccentric binaries
- dips in LCs – transits of circumstellar matter

....



Stellar astrophysics

Školitel/supervisor: Miloslav Zejda or others

O-C database with analytical tools

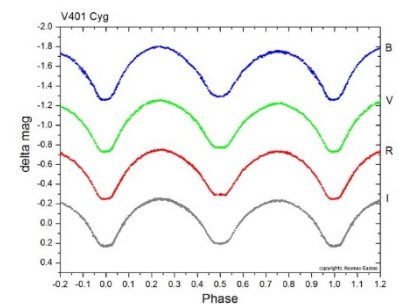
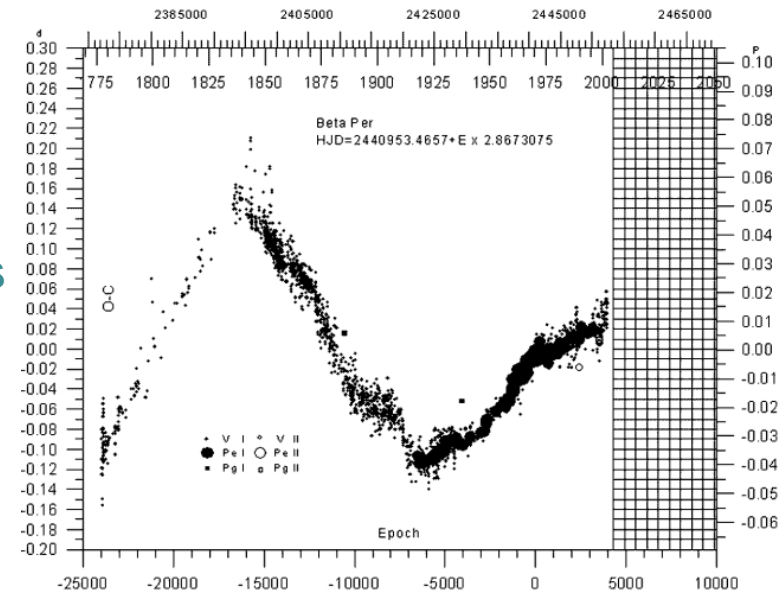
O-C databáze s analytickými nástroji

Quadruples/Čtyřhvězdy

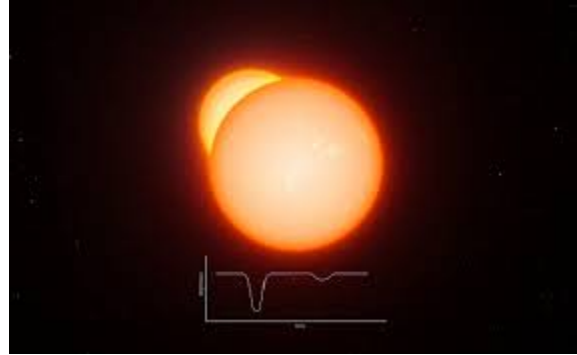
Period limit of contact binaries/Limit oběžných period kontaktních dvojhvězd

Záblesky u červených trpaslíků/Flares on red dwarfs

And others ...

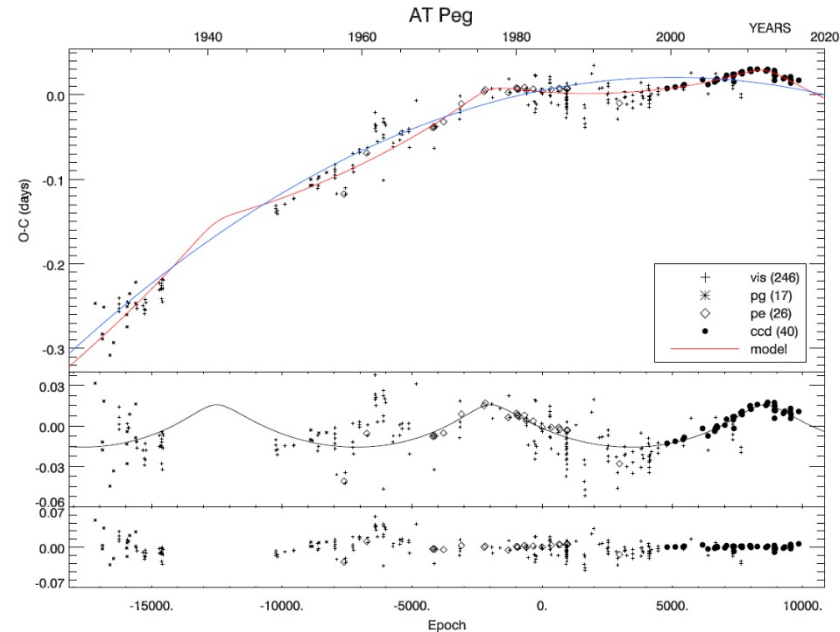
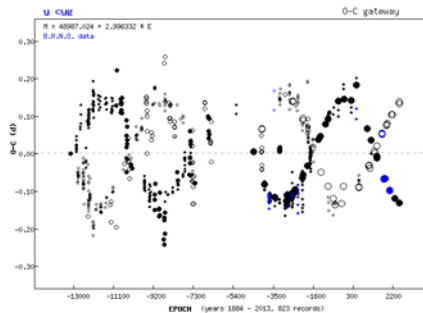
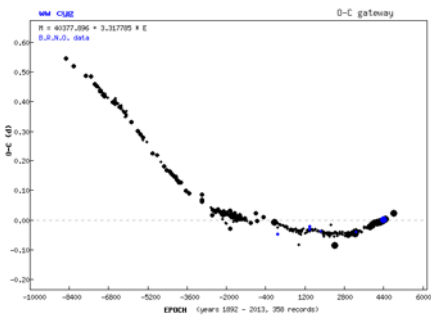


O-C database with analytical tools



The most common tools for studying eclipsing binaries:

- light/phase curve,
- radial velocity curve,
- O-C diagram (display the development of differences between observed and calculated/predicted timings of minima)

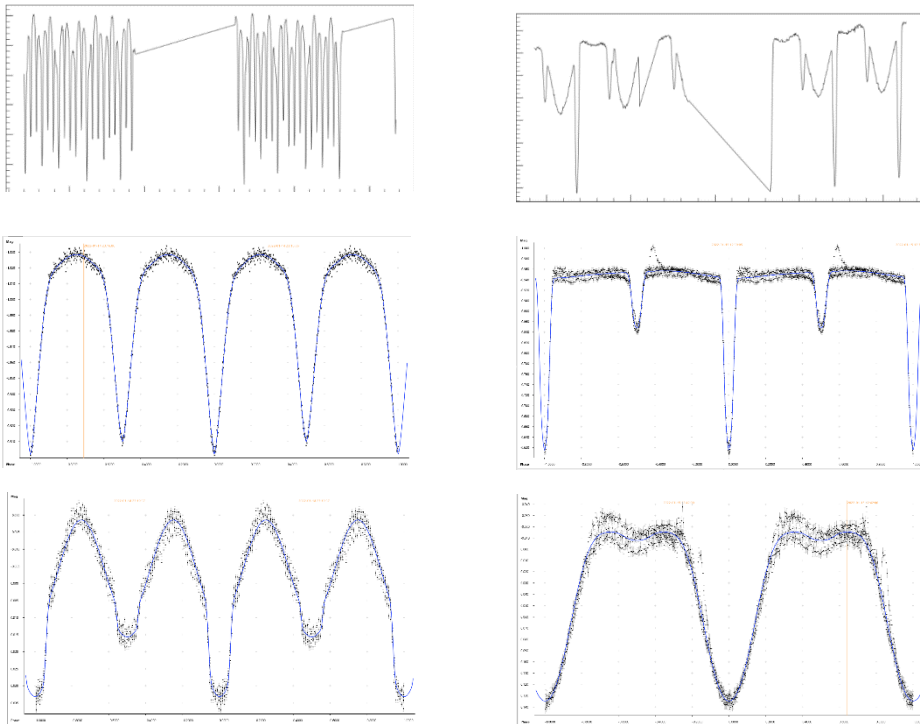


Aim:

- ❖ management of database of minima timings (O-C)
- ❖ tools for calculations of fit of O-C curves, subtracting fits, calculations of new ephemeris, prediction of future behaviour

Can be used for TTVs at exoplanets!

Quadruples



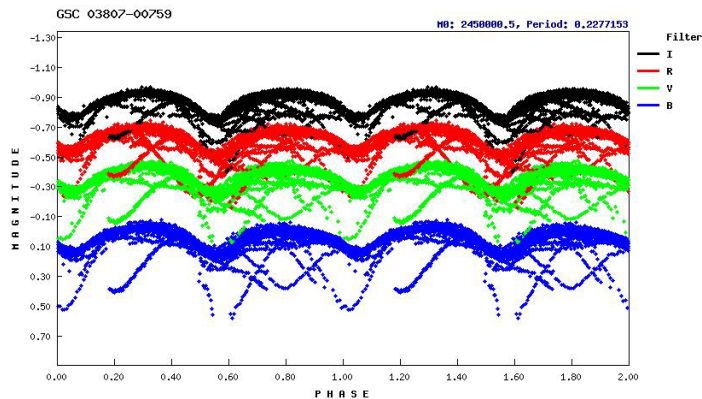
new insight to the stellar formation mechanisms (see e.g. Tokovinin 2021)

nowadays >800 systems (Kolář+,2024)

quadruple systems - common orbit around barycenter, stars with same distance, same age, and same metallicity => important for checking our models of stellar origin and evolution

Tasks:

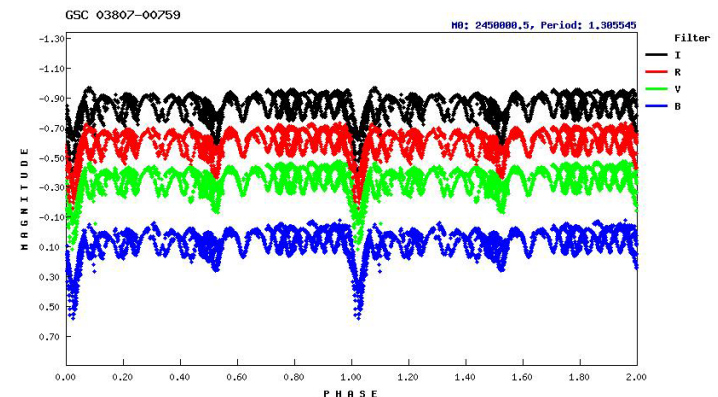
- ❖ unveiling new quadruple systems
- ❖ detail study of the system, determination of parameters
- ❖ study of period resonance



V441+V442 UMa

quintuple system

one of the first multiple system



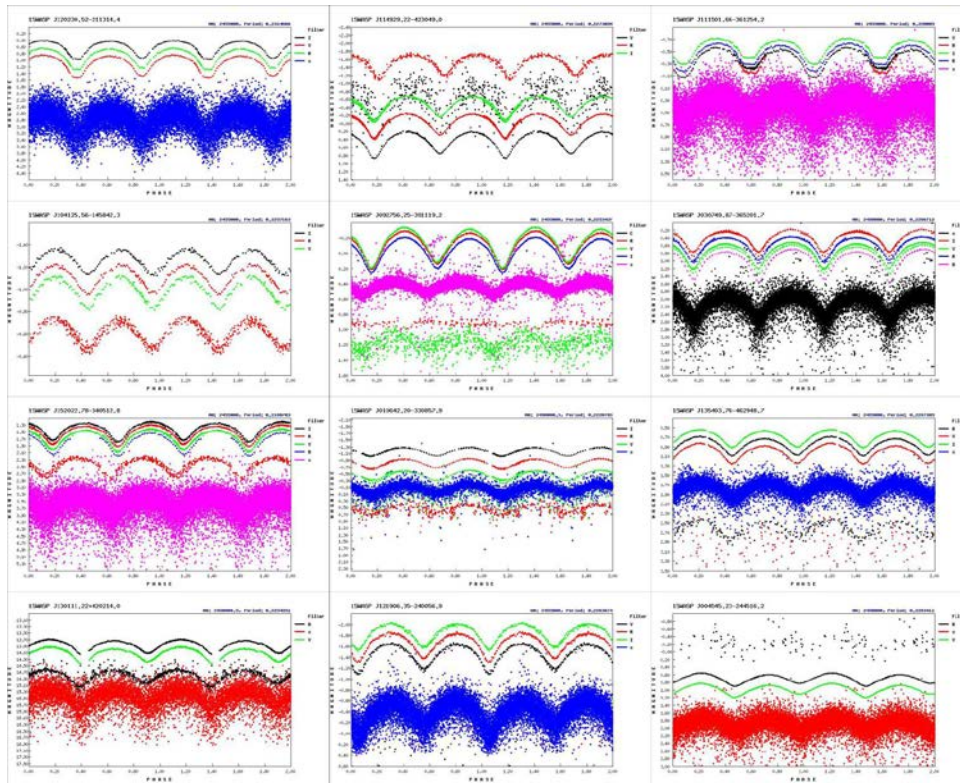
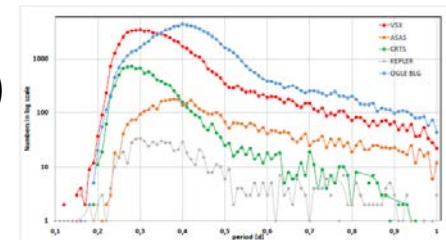
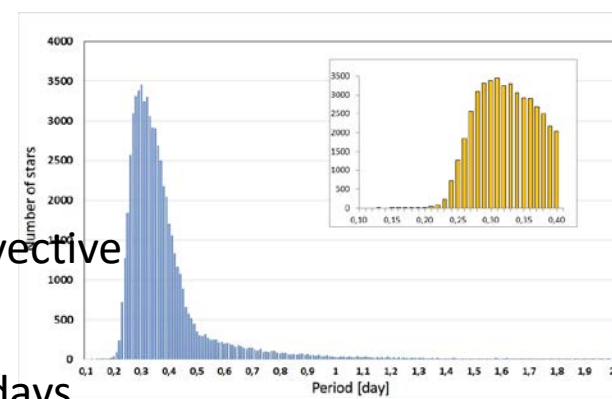
Period limit of contact binaries

EW-type contact binaries – 2 cool dwarfs with common convective envelope

period distribution of EWs => short-period limit around 0.2 days

why?

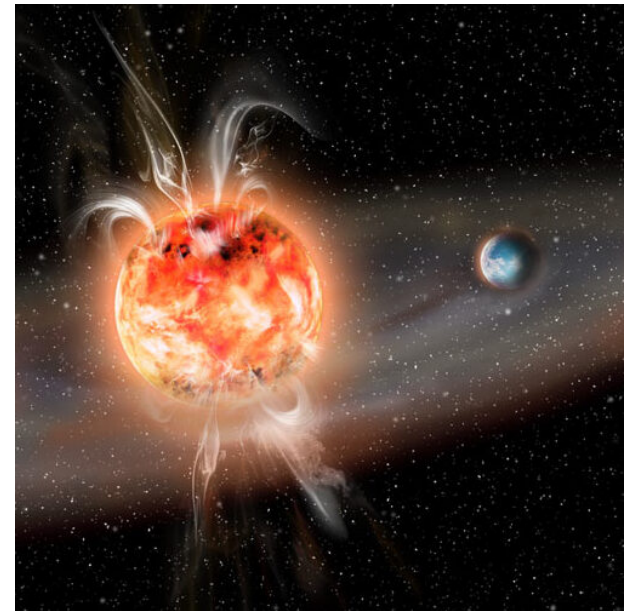
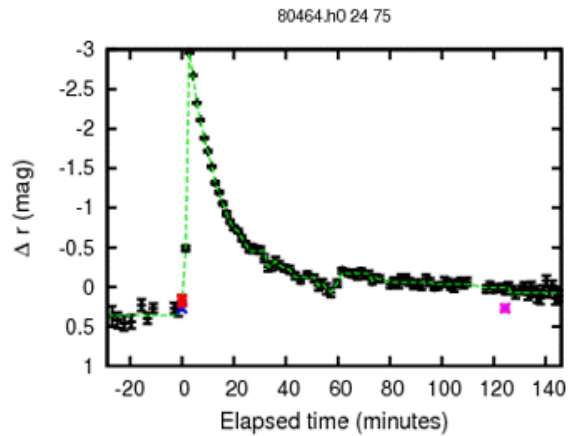
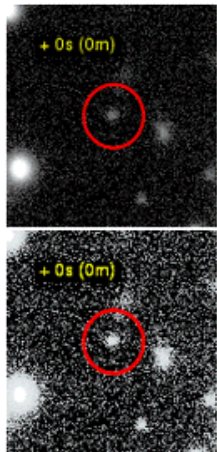
two competing theories Stepien (2006,2011) x Jiang+ (2013)



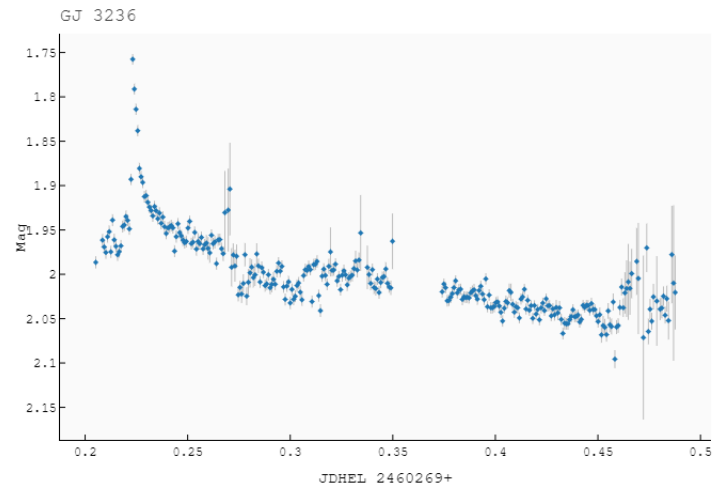
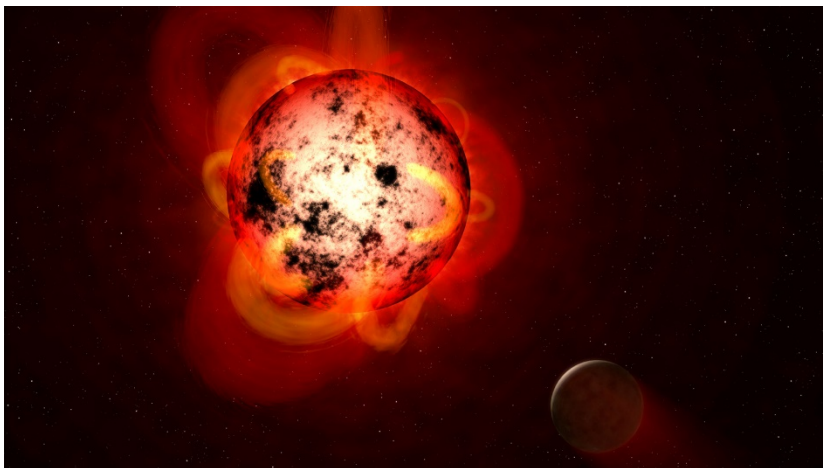
Tasks:

- analysis of collected observations
- add new phot.+spectr. observations
- determination of evolutionary status
- check the theories

Flashes on red dwarfs



influence on habitability of exoplanets



frequency, position, mechanism