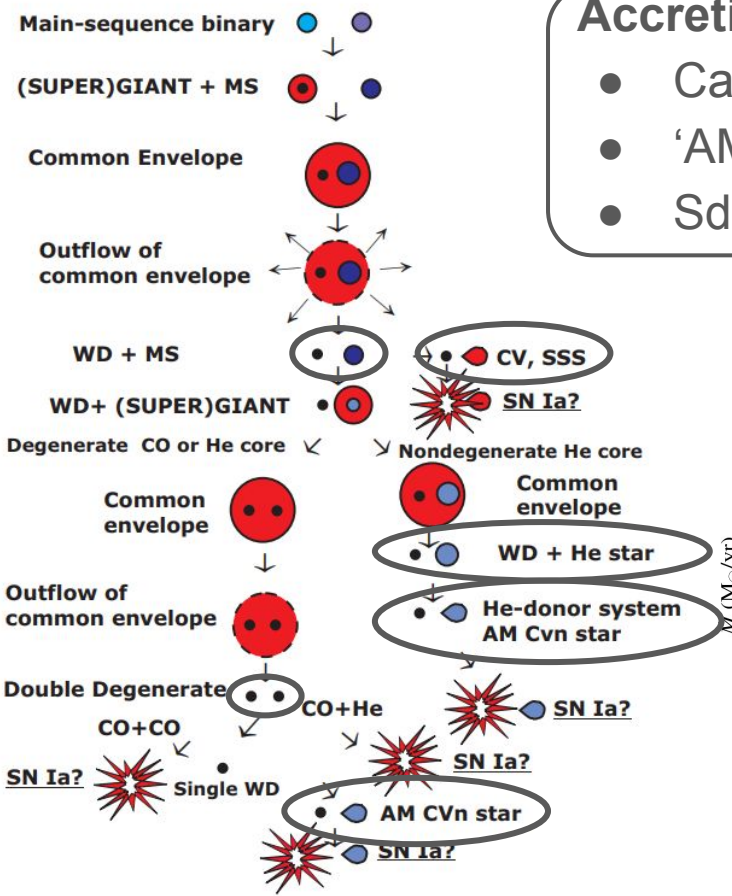
Short period white dwarf binaries

Uncovering the population of eclipsing white dwarf binaries with ZTF

Overview



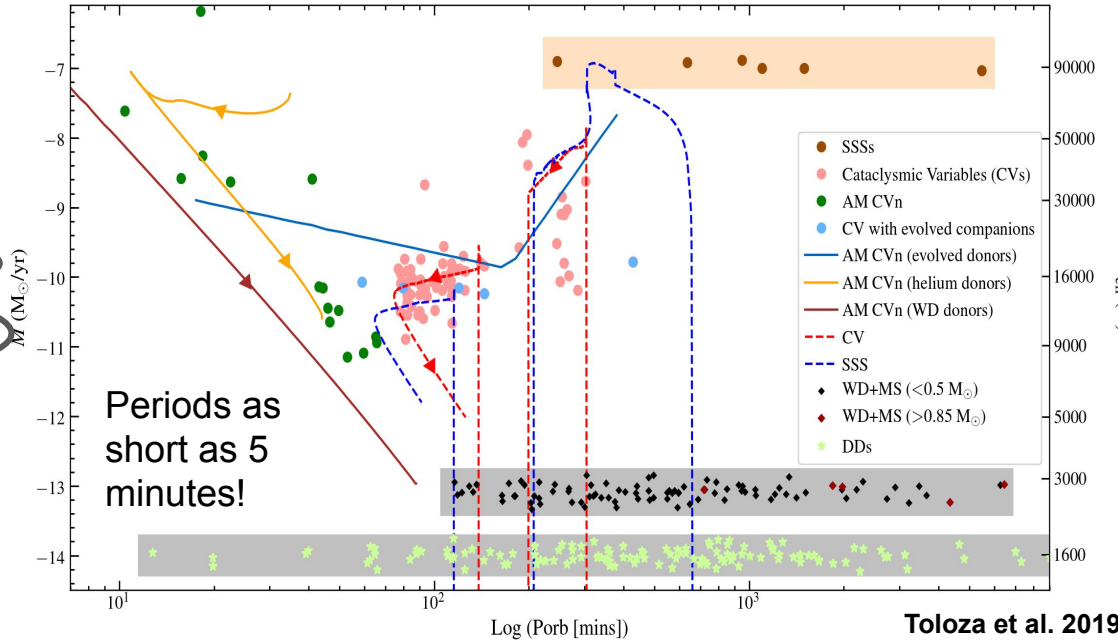
Postnov & Yungelson 2014

Accreting systems

- Cataclysmic Variables
- ‘AM CVn’-systems
- SdB-WD

Detached

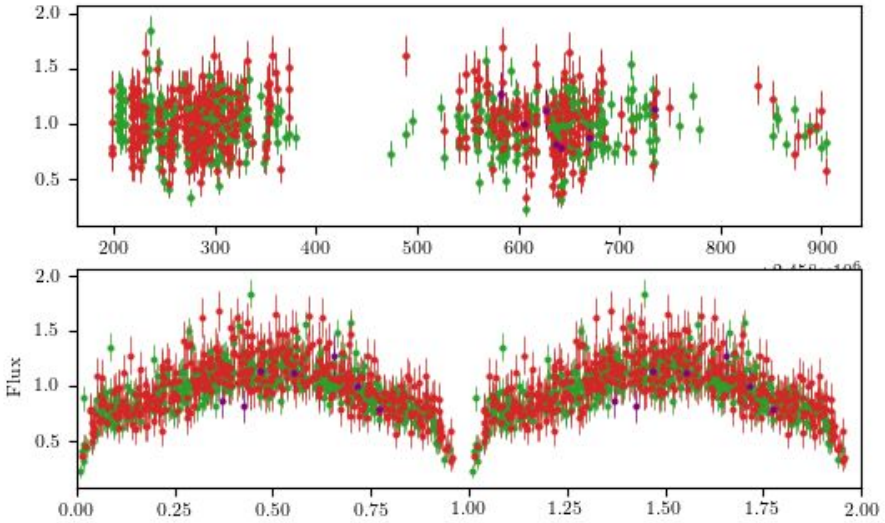
- WD - WD
- WD - dM/BD binaries
- WD - giant planets



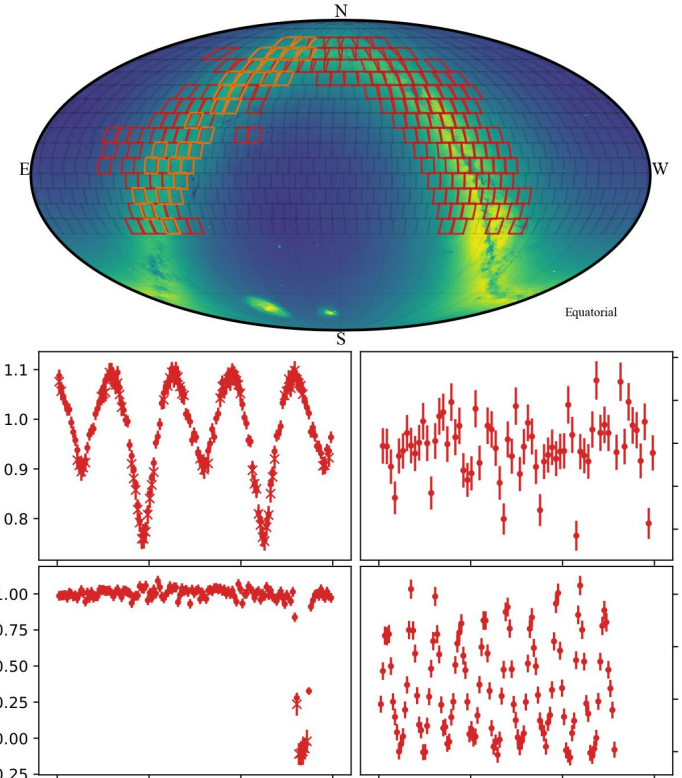
Toloza et al. 2019

Searching for short period variables

GPU period finding algorithms to search the ZTF all-sky survey data:

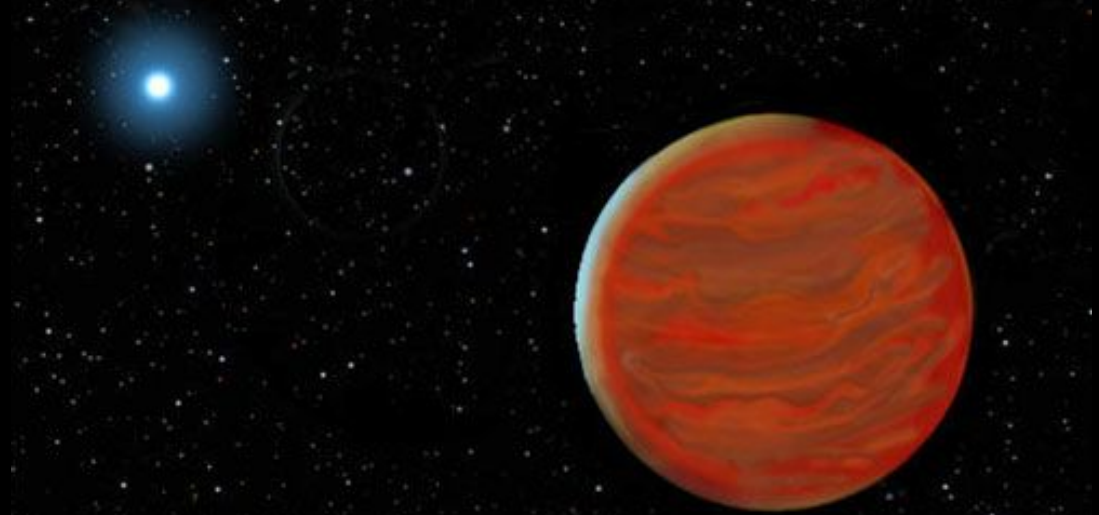


Dedicated **deep-drilling observations** of the Galactic Plane.

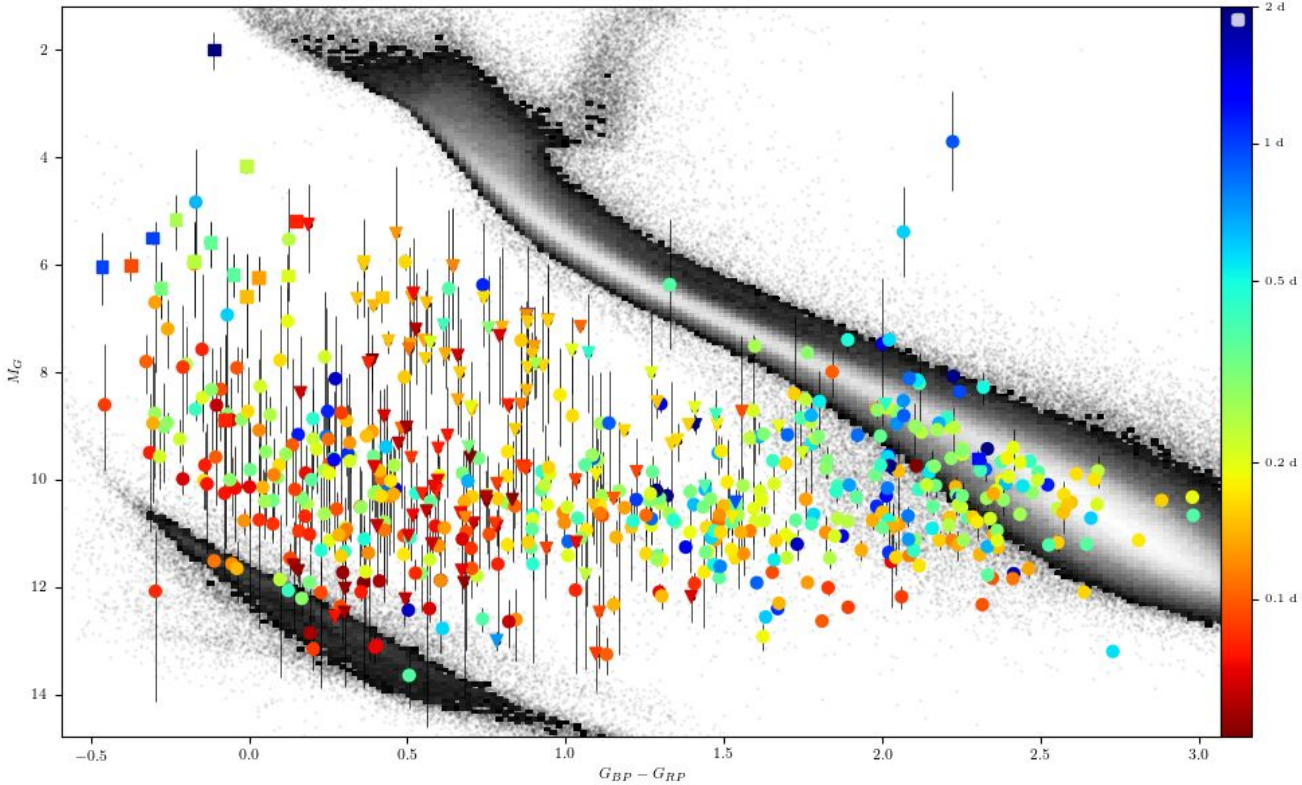


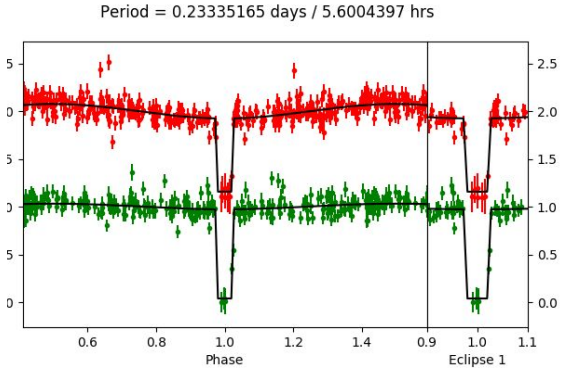
White dwarf with low-mass companions

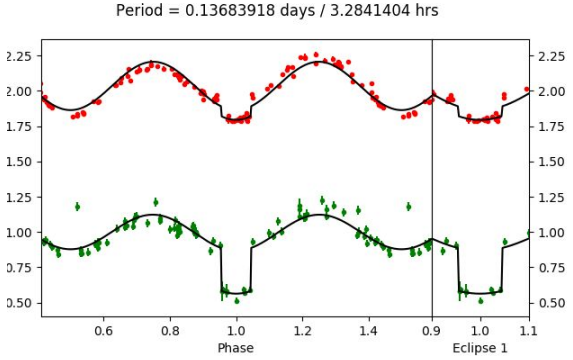
- Red dwarfs
- Brown dwarfs
- Giant planets



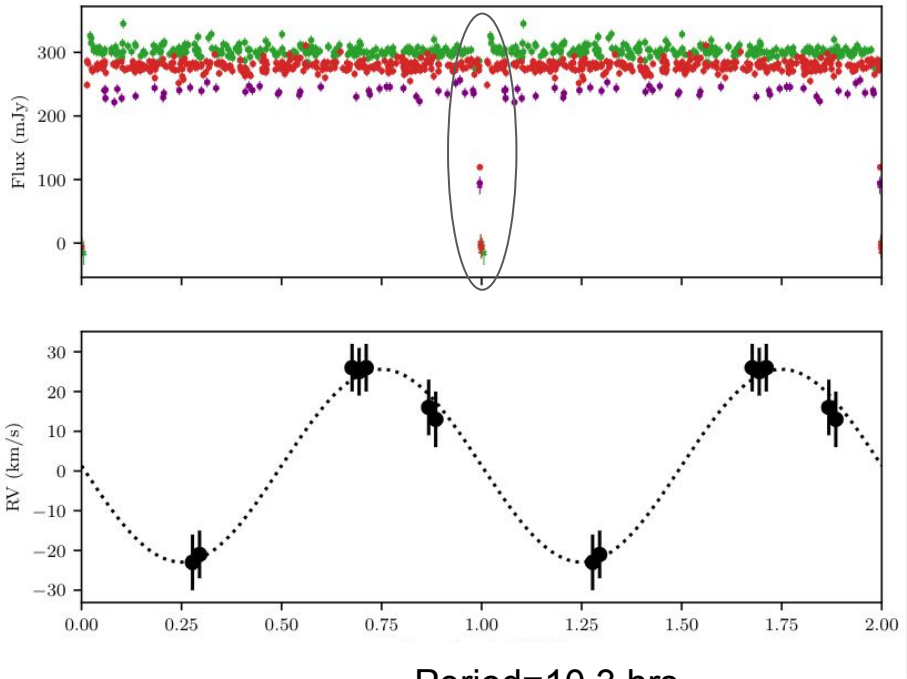
800+ eclipsing **WD+dM binaries**



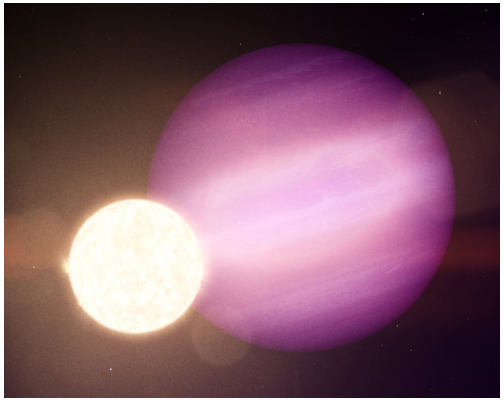




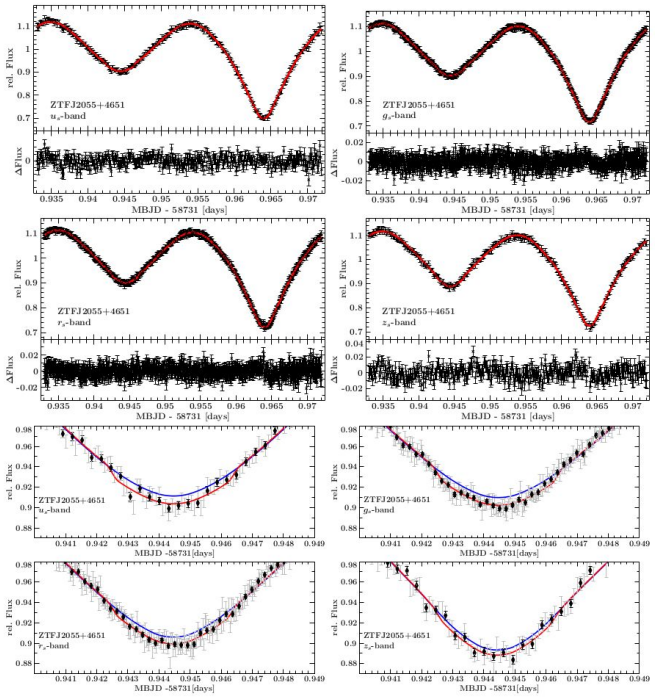
White dwarf - giant planet candidates

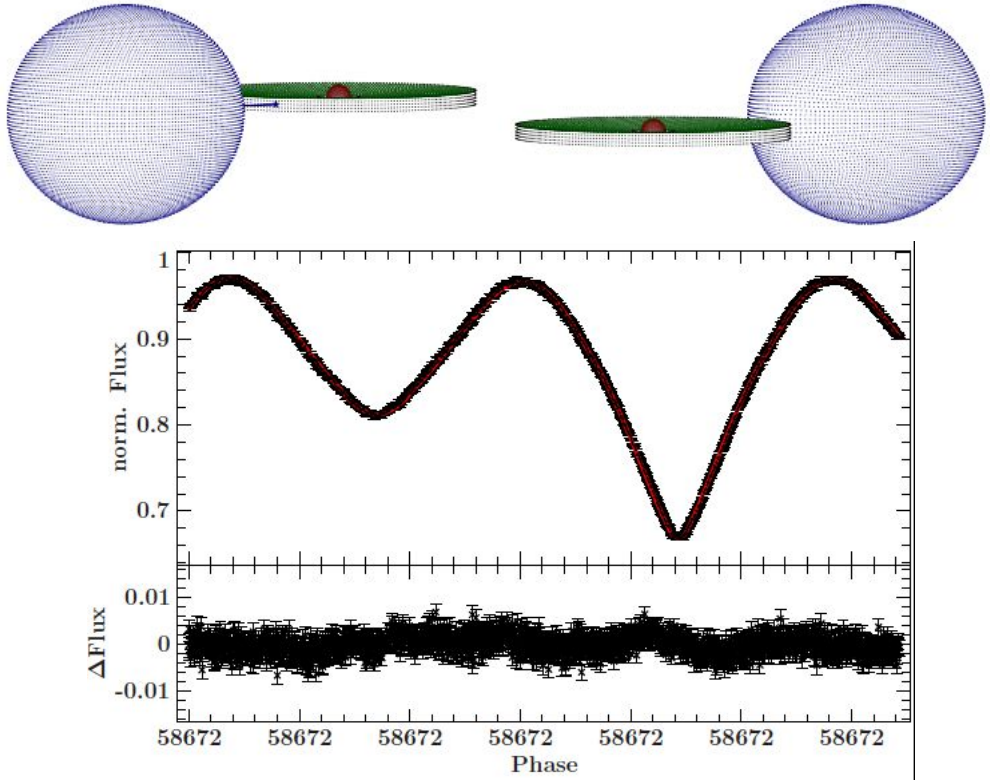


Period=10.3 hrs



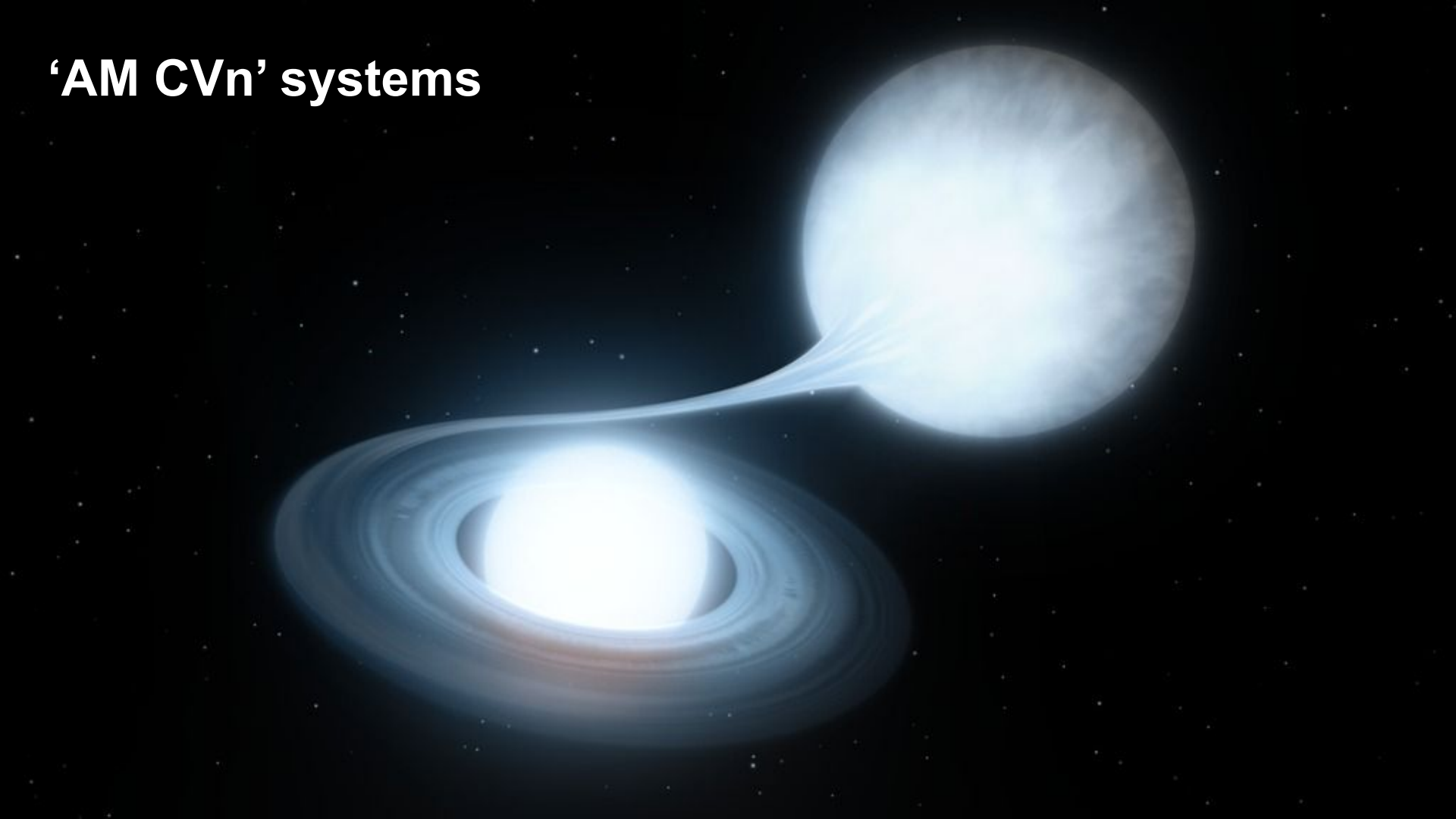
New: Accreting **Subdwarf B - WD** binaries



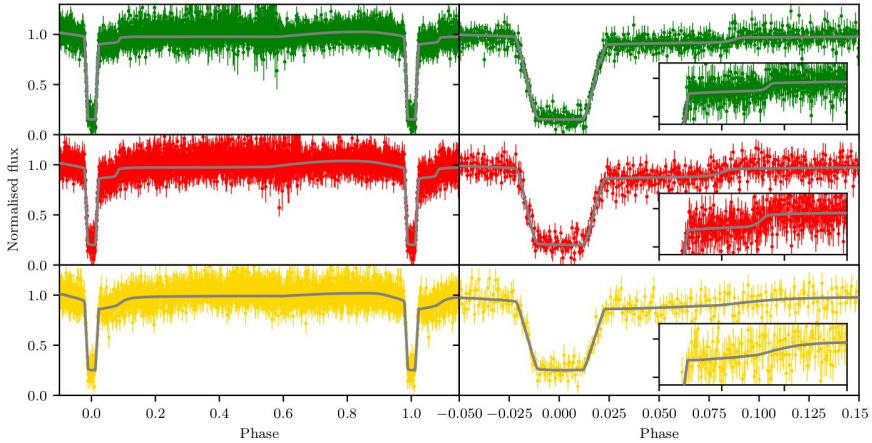


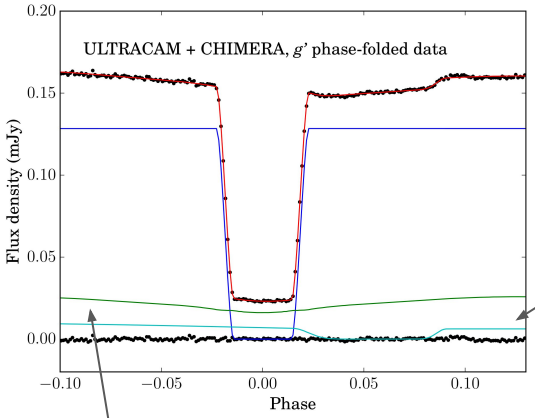
Kupfer et al 2019, ApJ
Kupfer et al 2020, ApJ

‘AM CVn’ systems



Eclipsing AMCVn: Solving the formation channel question

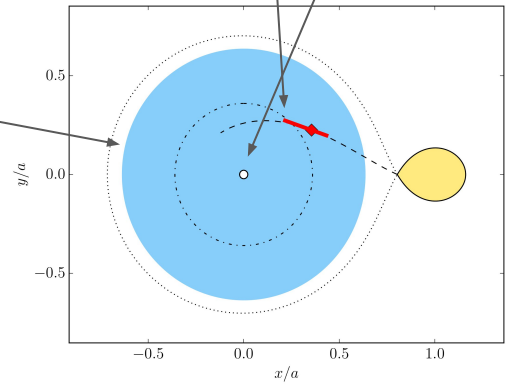


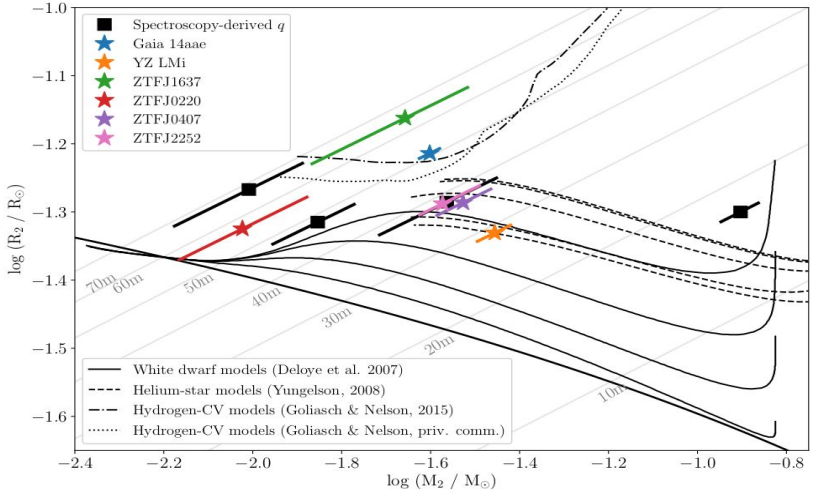


White dwarf

Brightspot

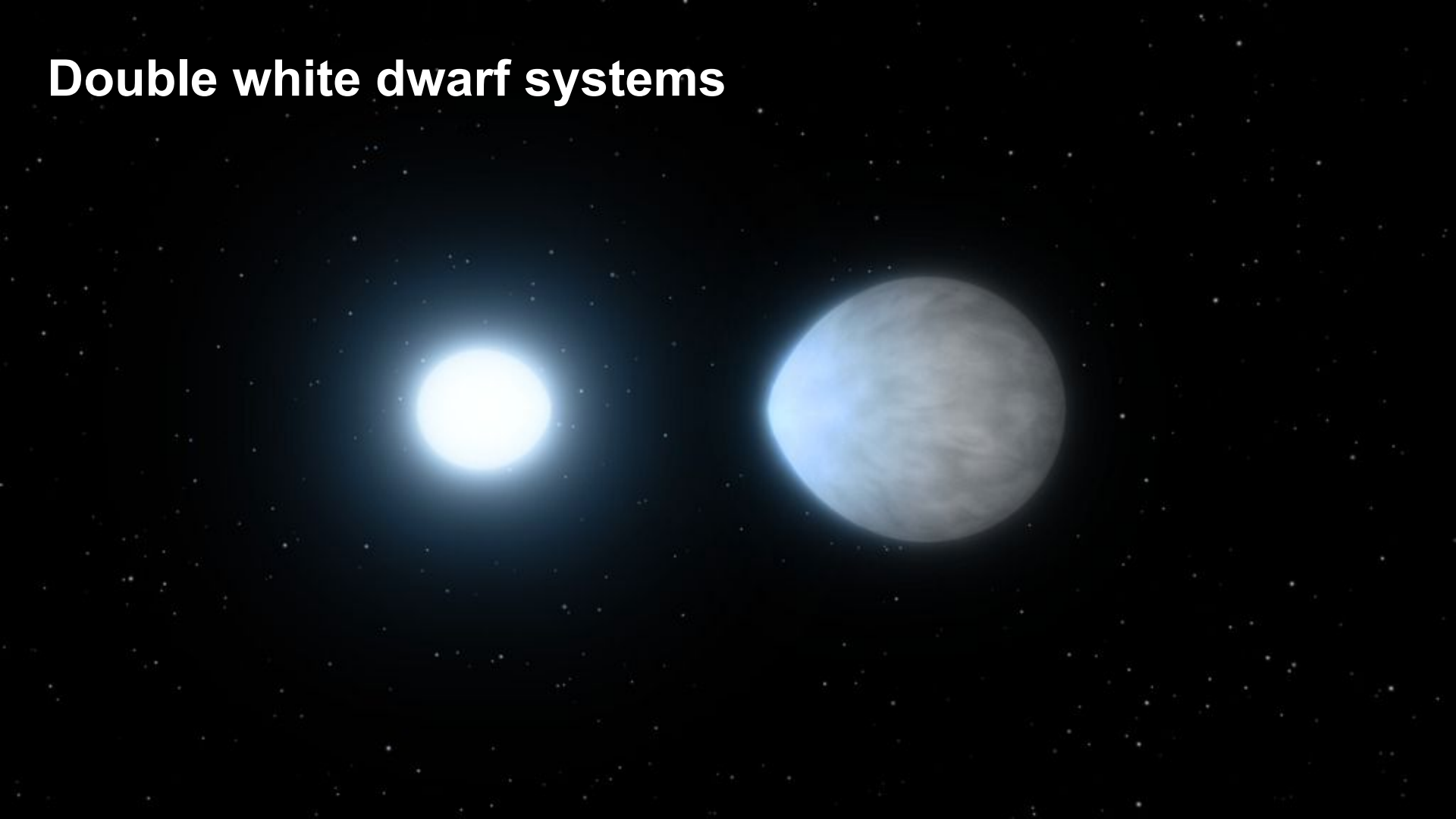
Disc



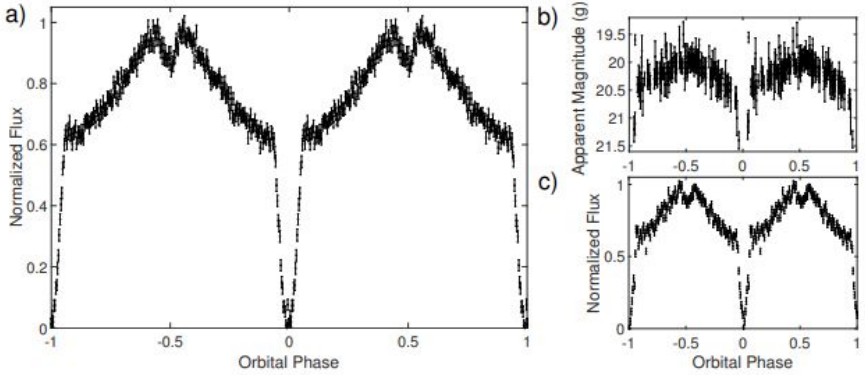


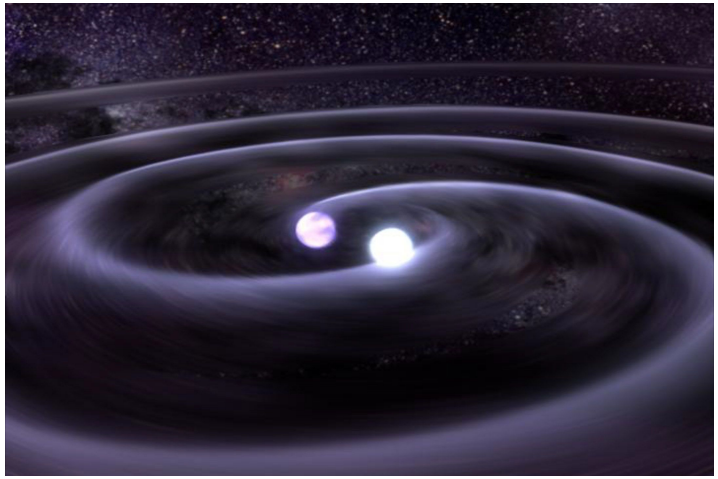
Credit: M. Green

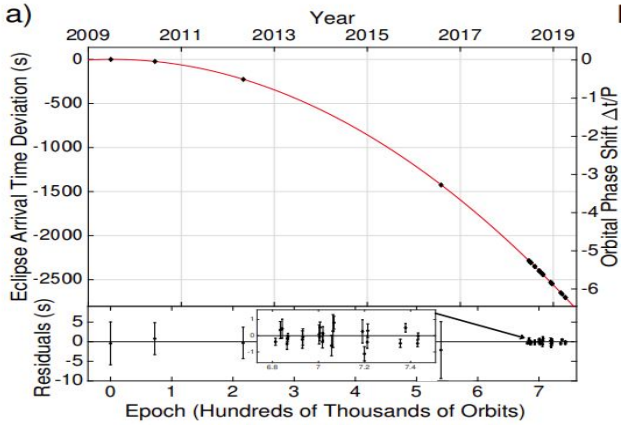
Double white dwarf systems



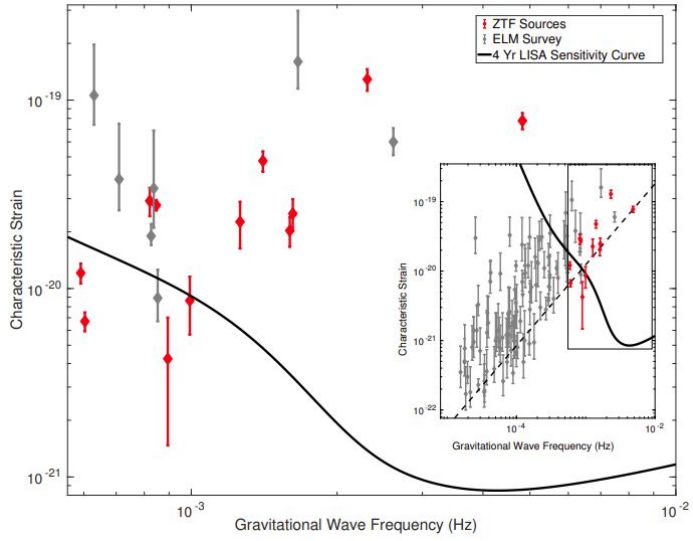
GW radiation from a 7.9 orbital period double white dwarfs

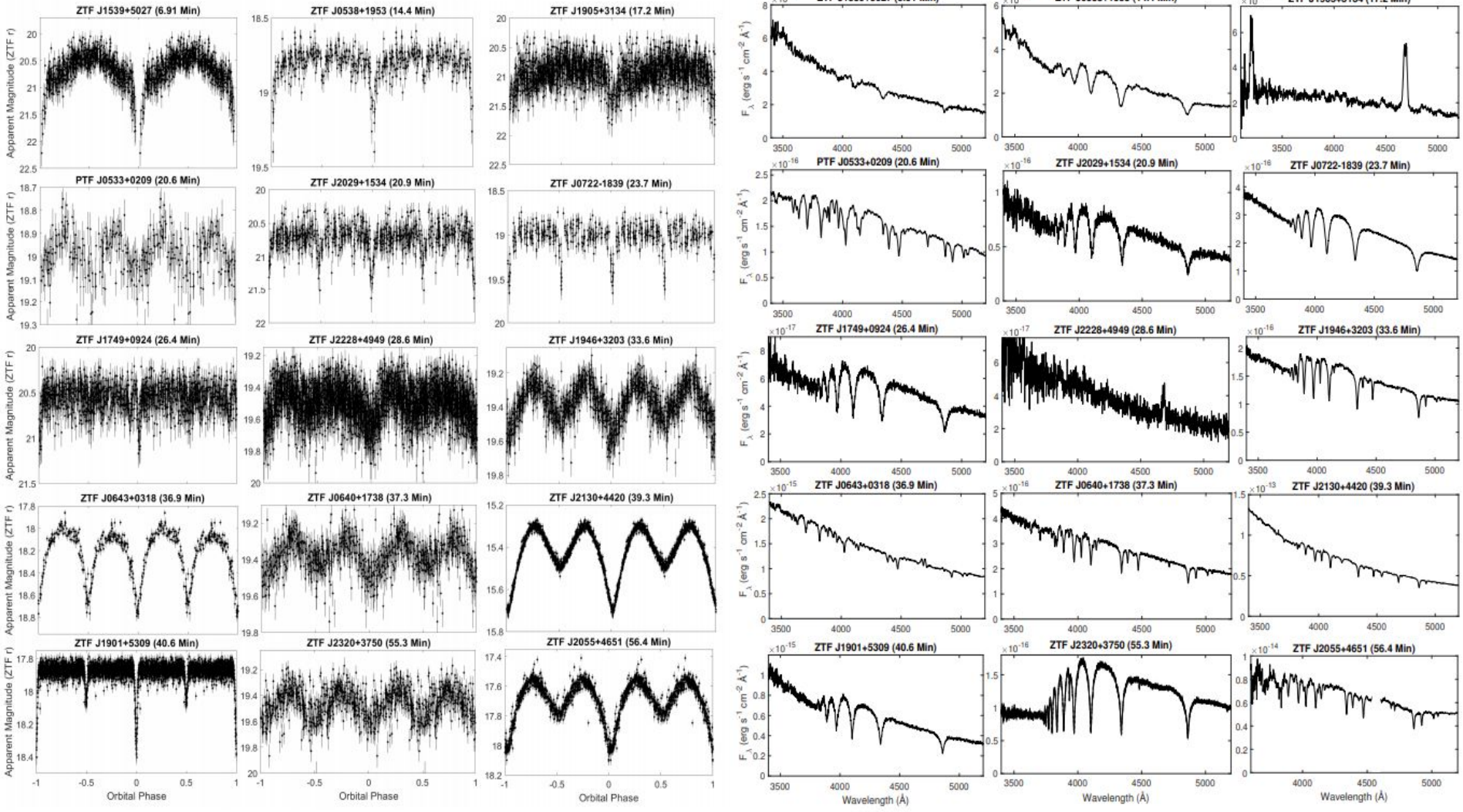






Burdge et al 2020




ZTF J1539+5027 (6.91 Min)
ZTF J0538+1953 (14.4 Min)
ZTF J1905+3134 (17.2 Min)
PTF J0533+0209 (20.6 Min)
ZTF J2029+1534 (20.9 Min)
ZTF J0722-1839 (23.7 Min)
ZTF J1749+0924 (26.4 Min)
ZTF J2228+4949 (28.6 Min)
ZTF J1946+3203 (33.6 Min)
ZTF J0643+0318 (36.9 Min)
ZTF J0640+1738 (37.3 Min)
ZTF J2130+4420 (39.3 Min)
ZTF J1901+5309 (40.6 Min)
ZTF J2320+3750 (55.3 Min)
ZTF J2055+4651 (56.4 Min)
Apparent Magnitude (ZTF r)
Orbital Phase
F_λ (erg s^{-1} cm^{-2} Å^{-1})
Wavelength (Å)