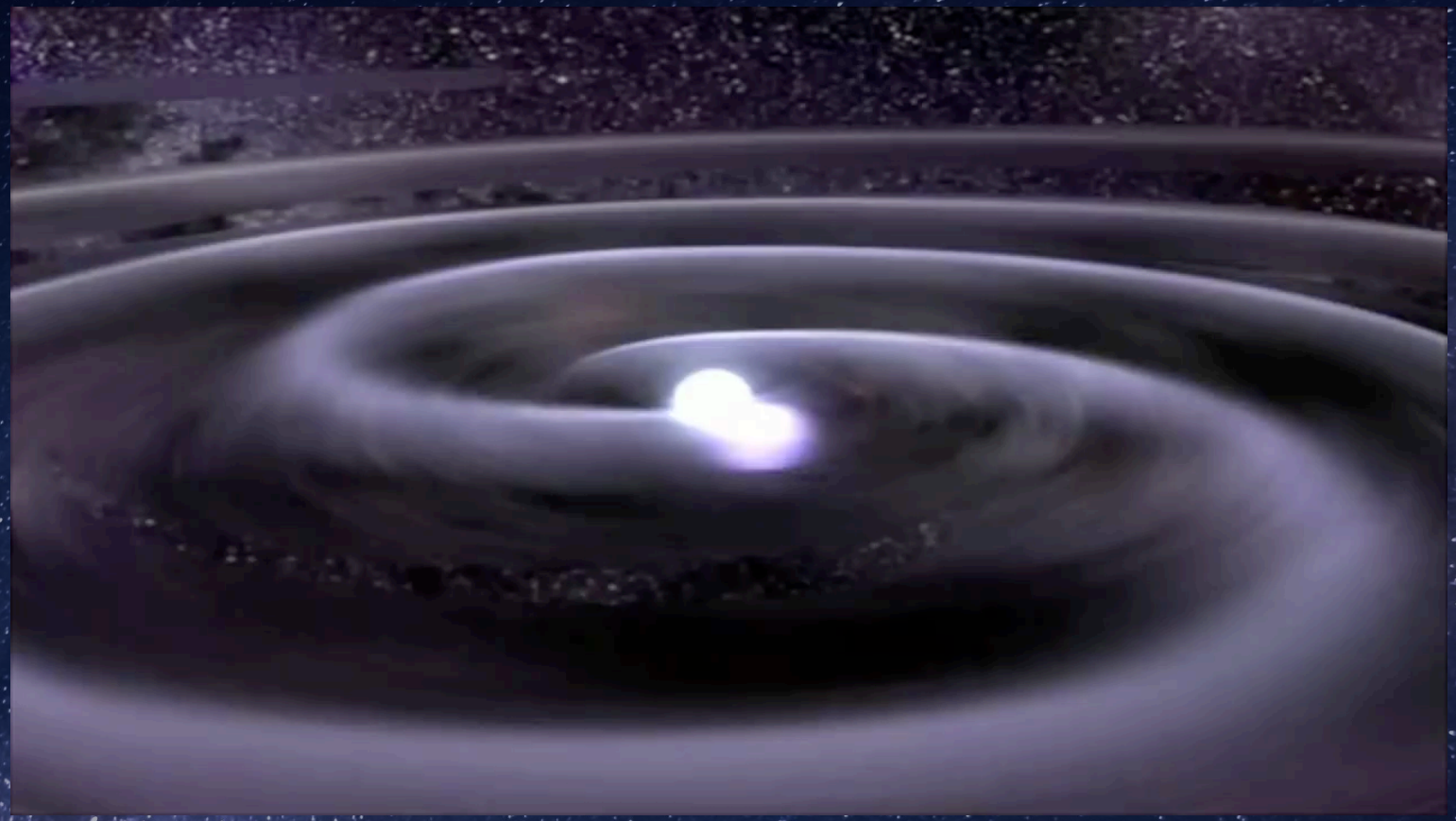


Rapidly rotating white dwarfs as merger candidates

Ilaria Caiazzo
Caltech

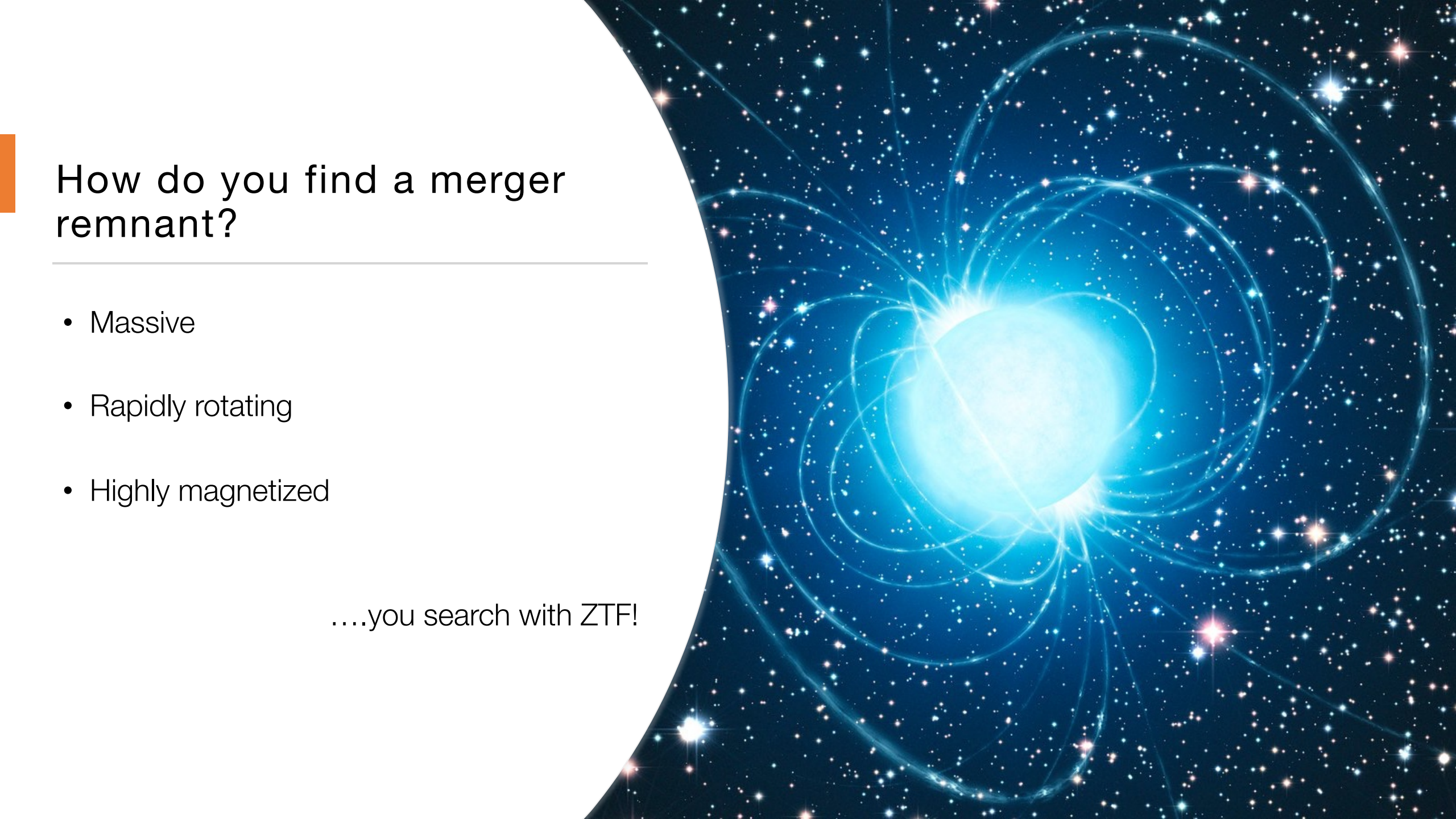
ZTF team meeting, October 20, 2020

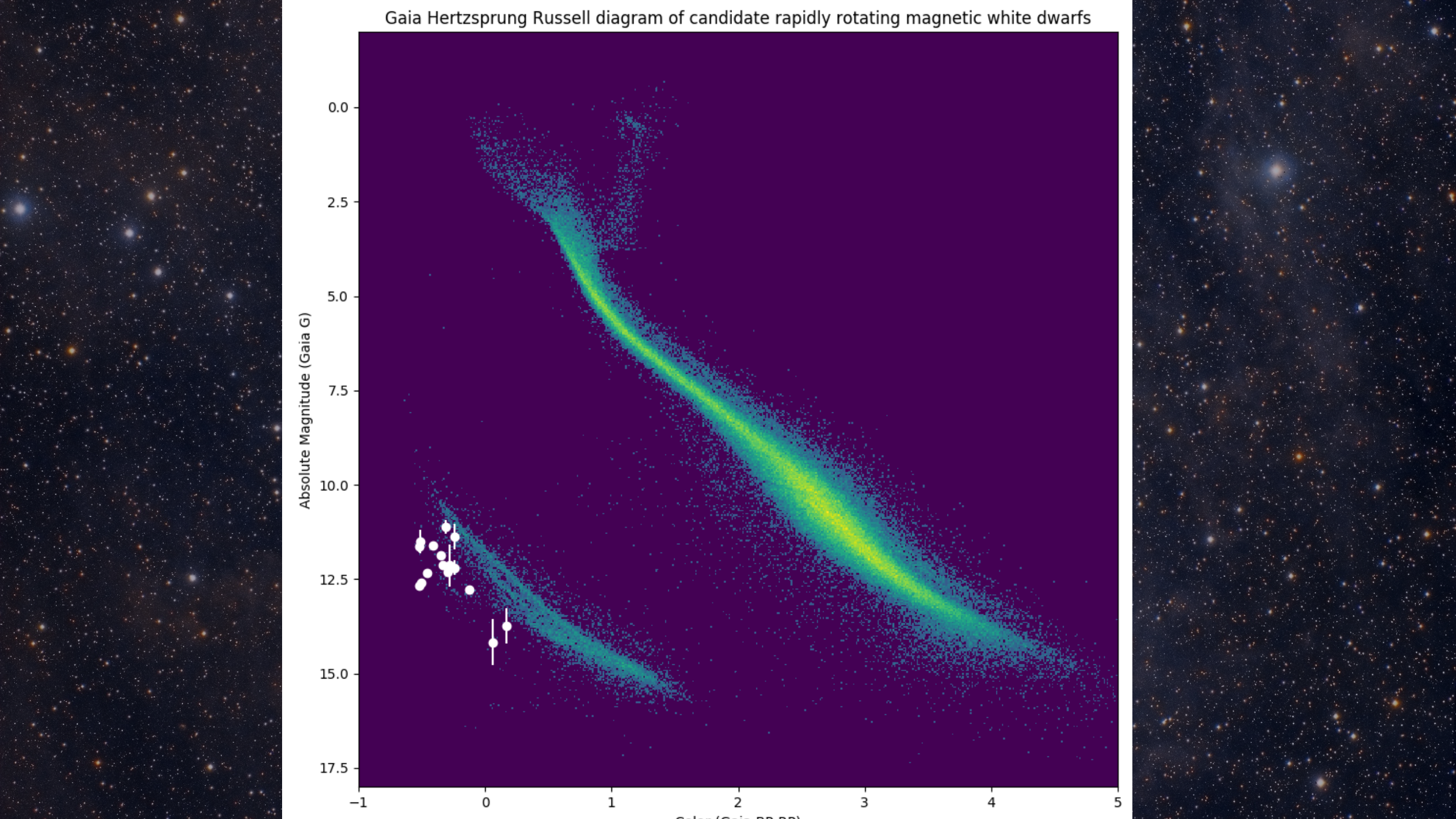
ZTF

How do you find a merger remnant?

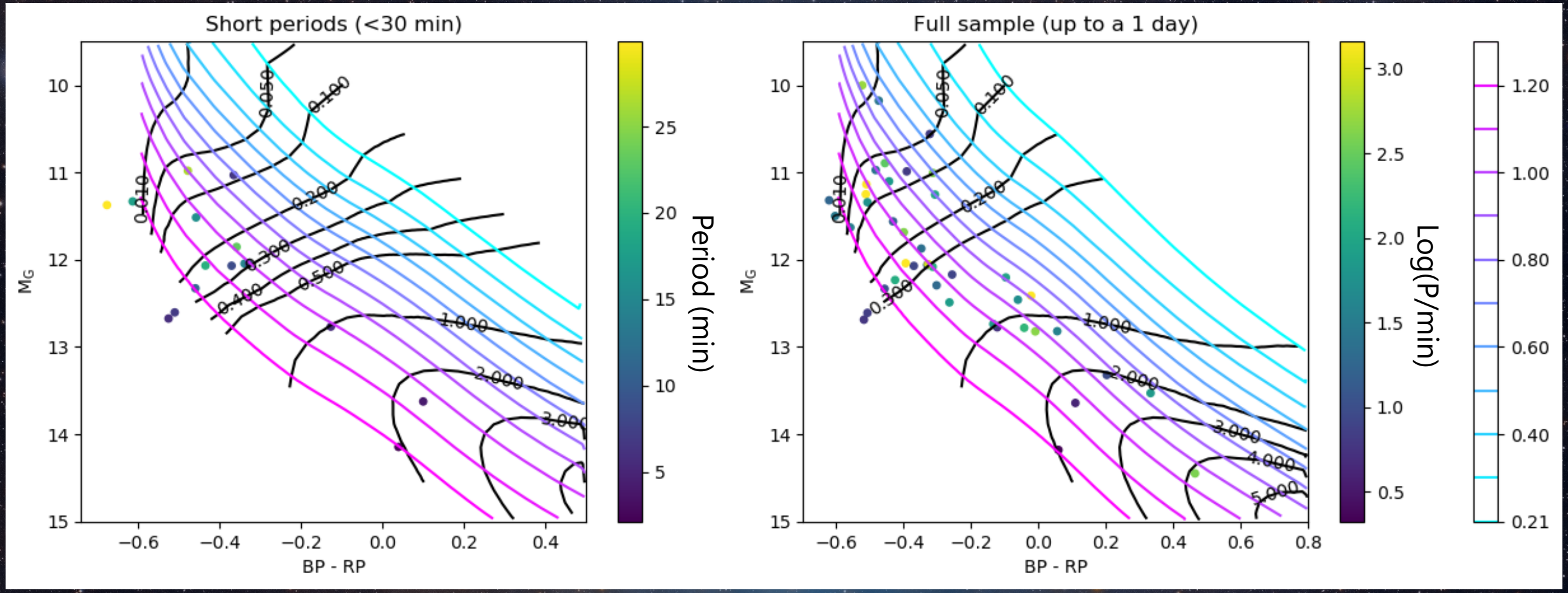
- Massive
- Rapidly rotating
- Highly magnetized

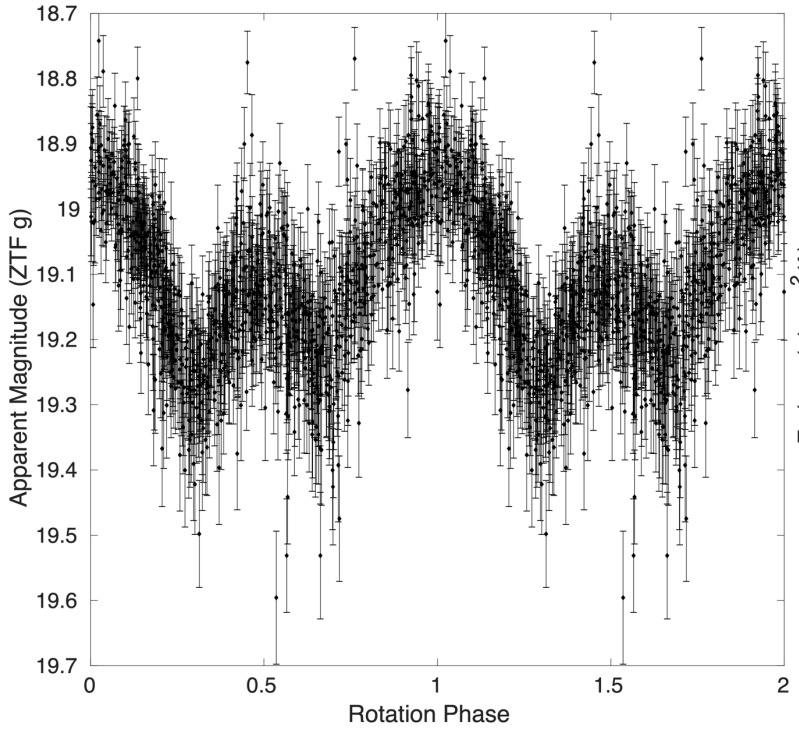
….you search with ZTF!

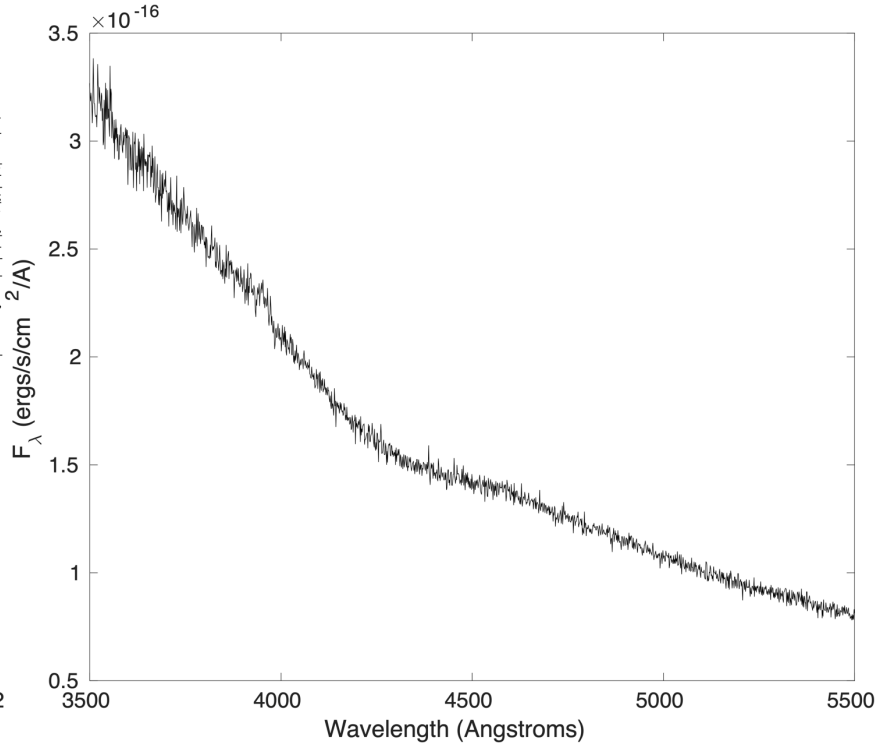


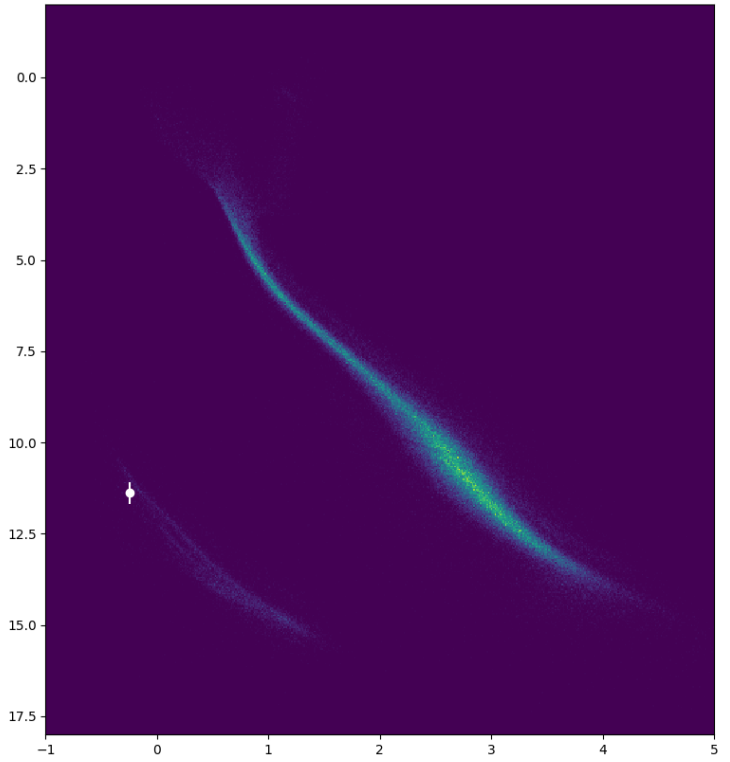

Gaia Hertzsprung Russell diagram of candidate rapidly rotating magnetic white dwarfs
Absolute Magnitude (Gaia G)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
−1
0
1
2
3
4
5

The current sample



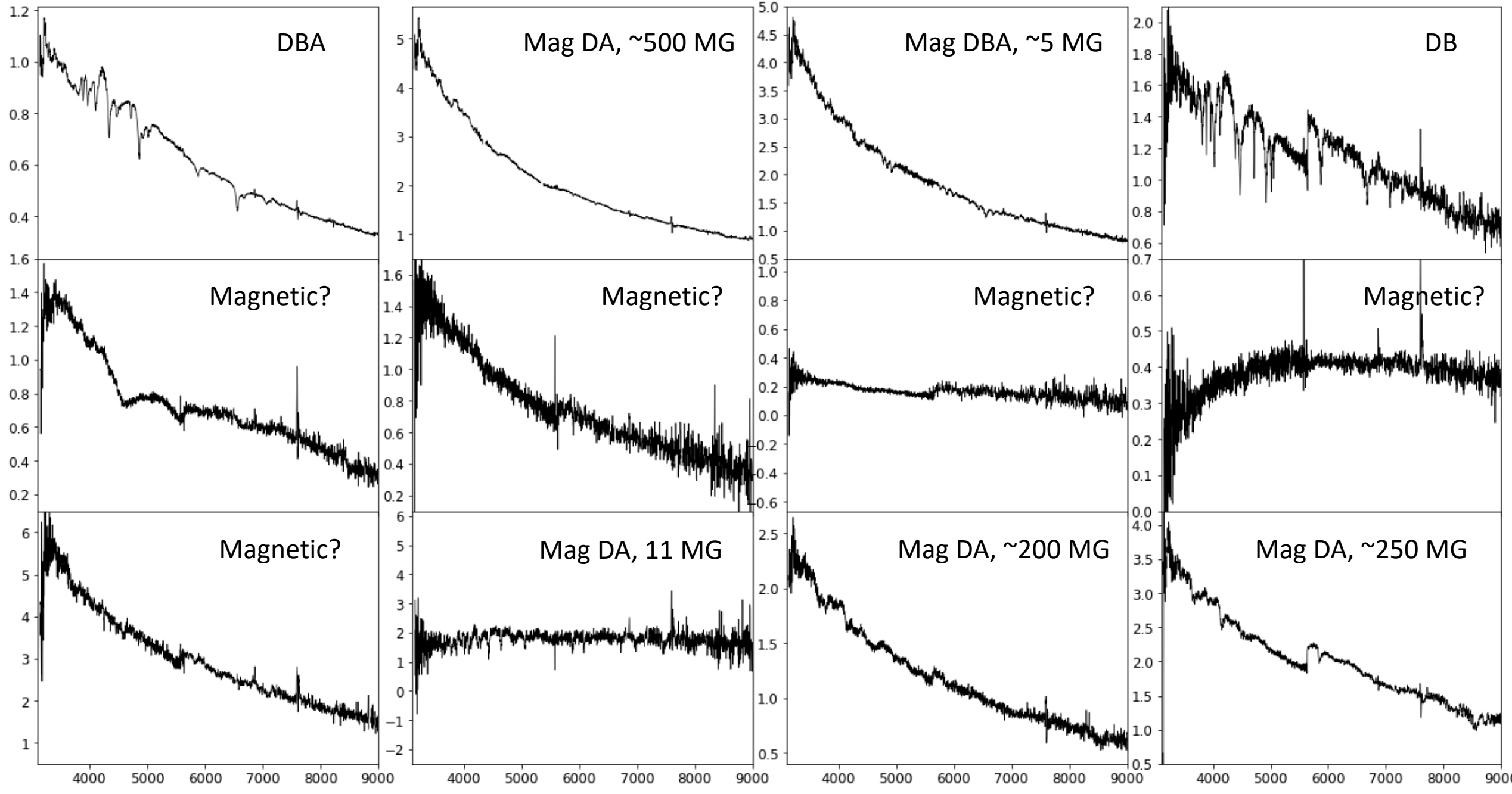




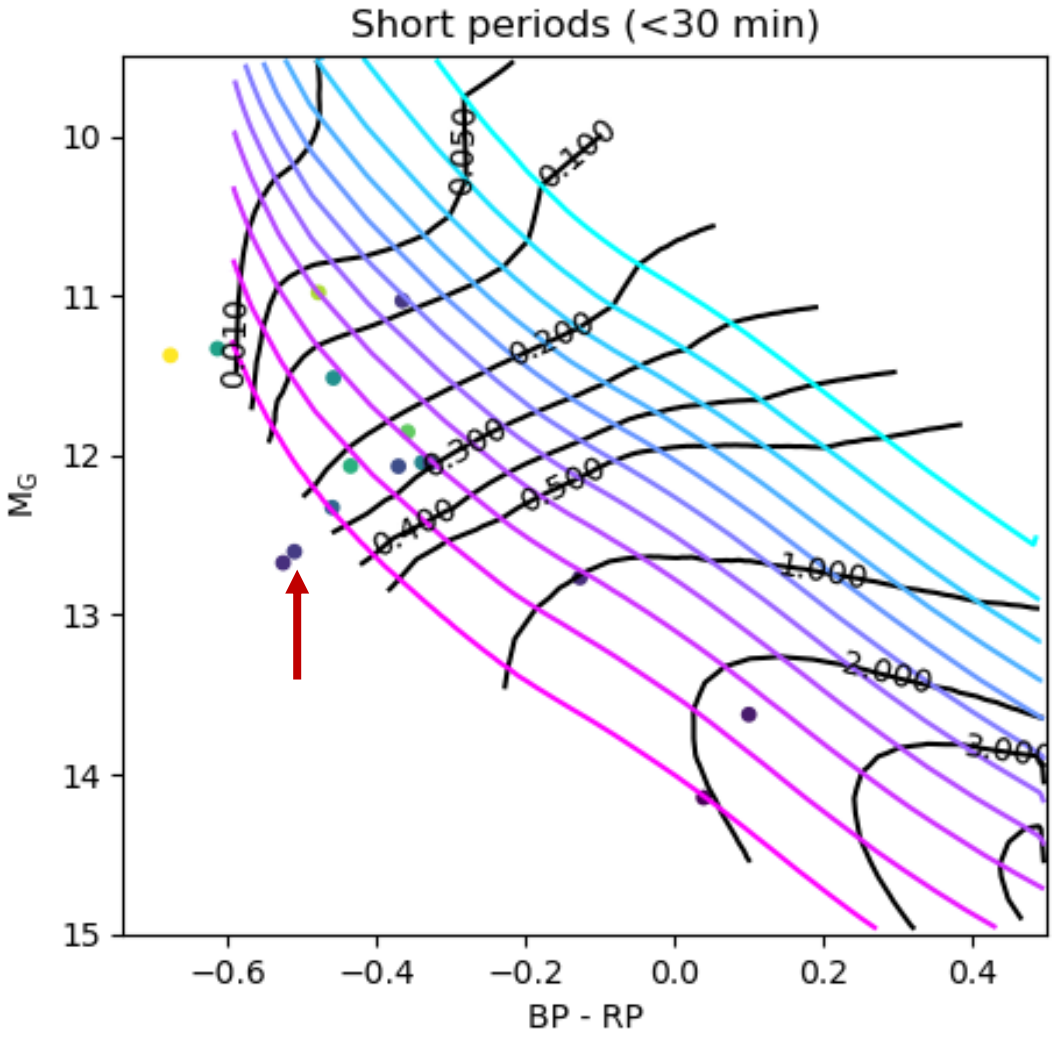


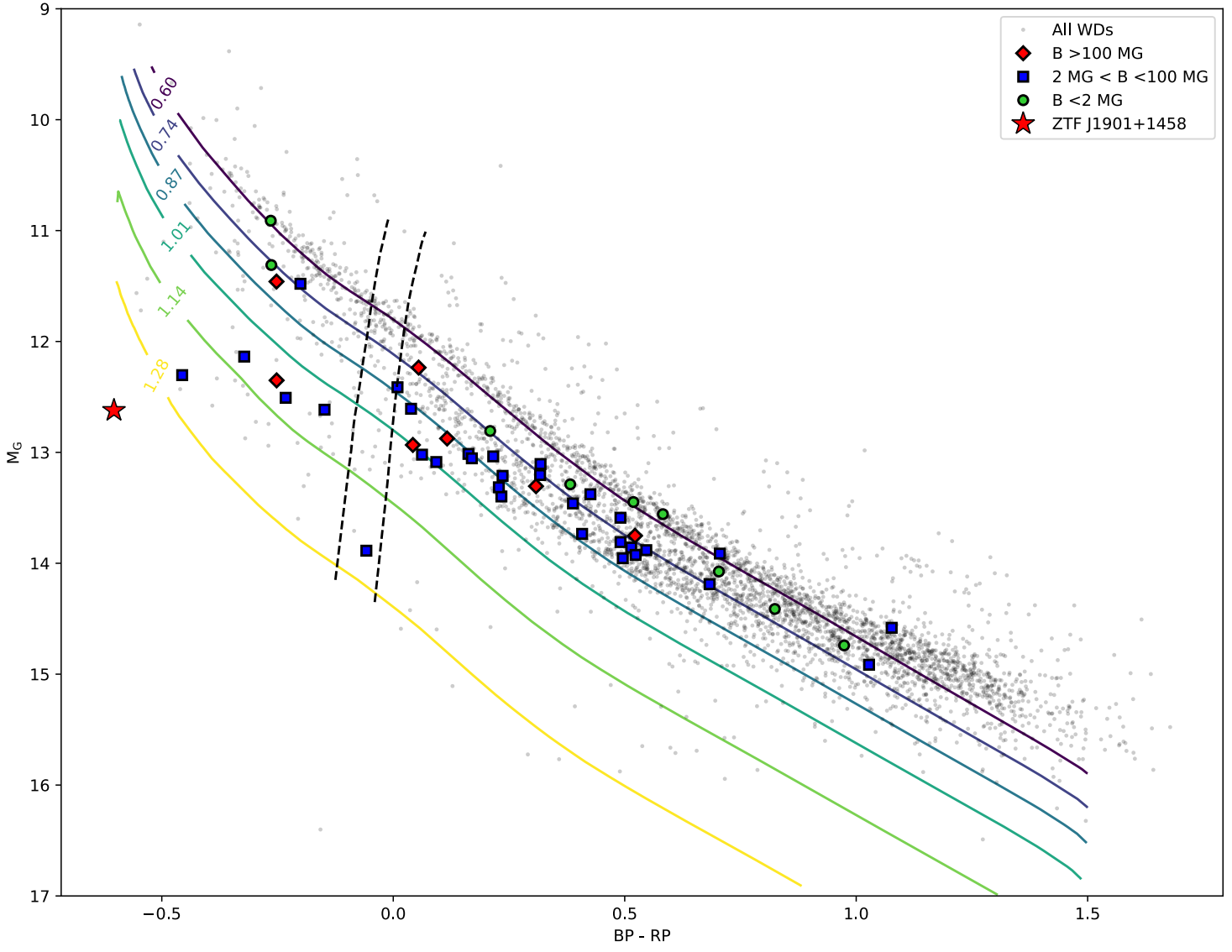
ZTF J0353+4315

- Period 26.5 min
- Peak-to-peak ~30

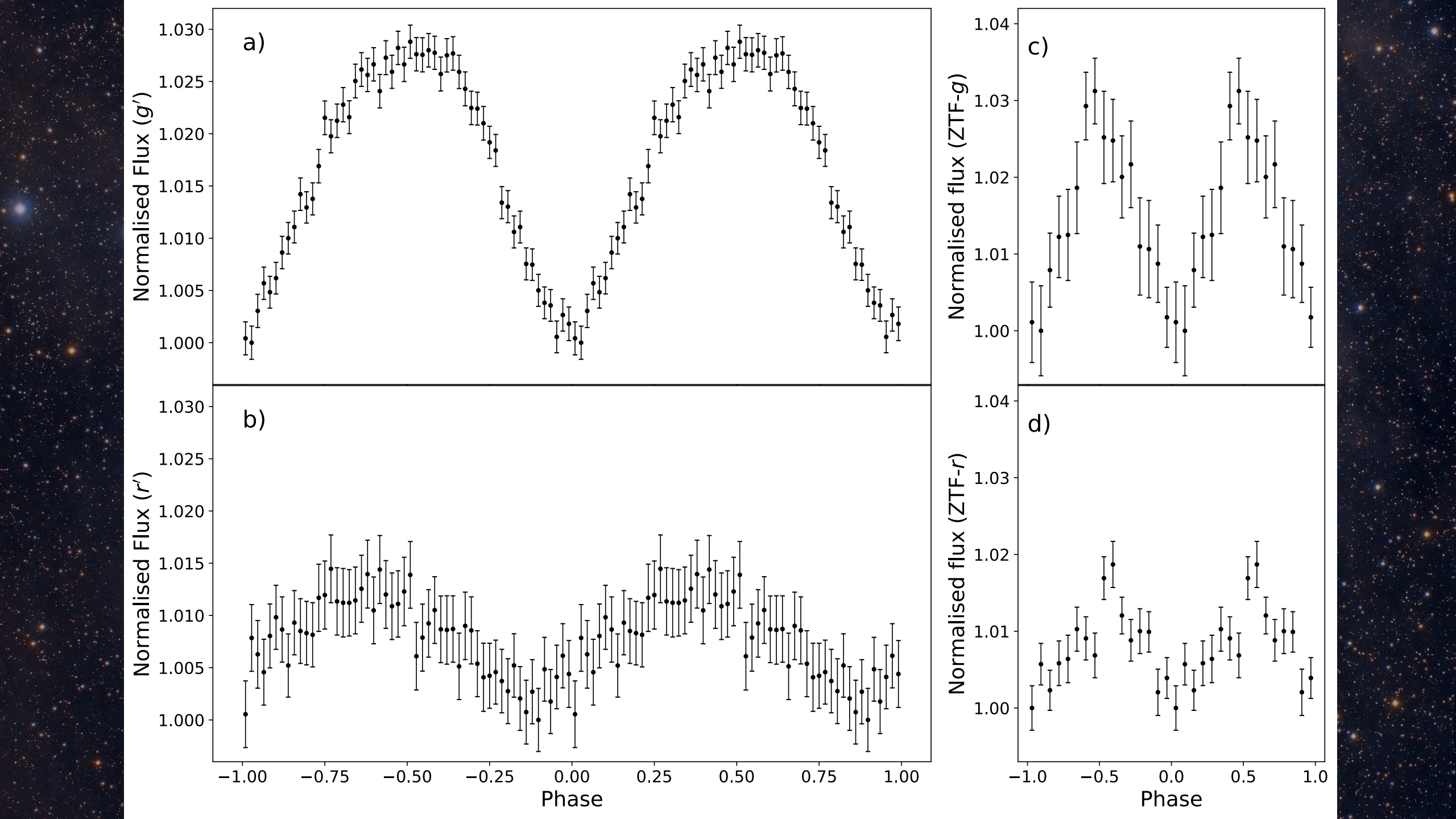

DBA
Mag DA, ~500 MG
Mag DBA, ~5 MG
DB
Magnetic?
Magnetic?
Magnetic?
Magnetic?
Magnetic?
Mag DA, 11 MG
Mag DA, ~200 MG
Mag DA, ~250 MG
4000
5000
6000
7000
8000
9000

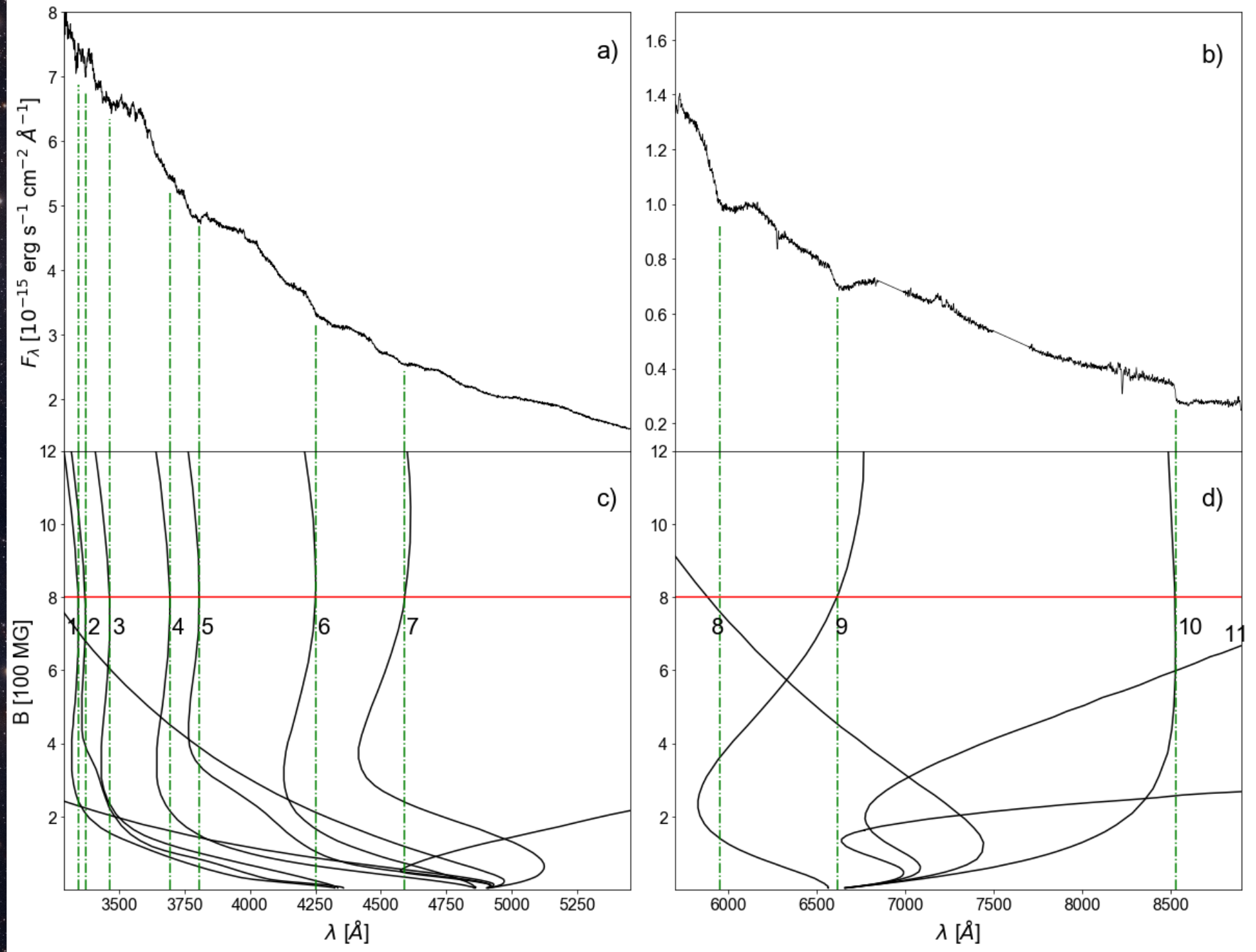
ZTF J1901+1458





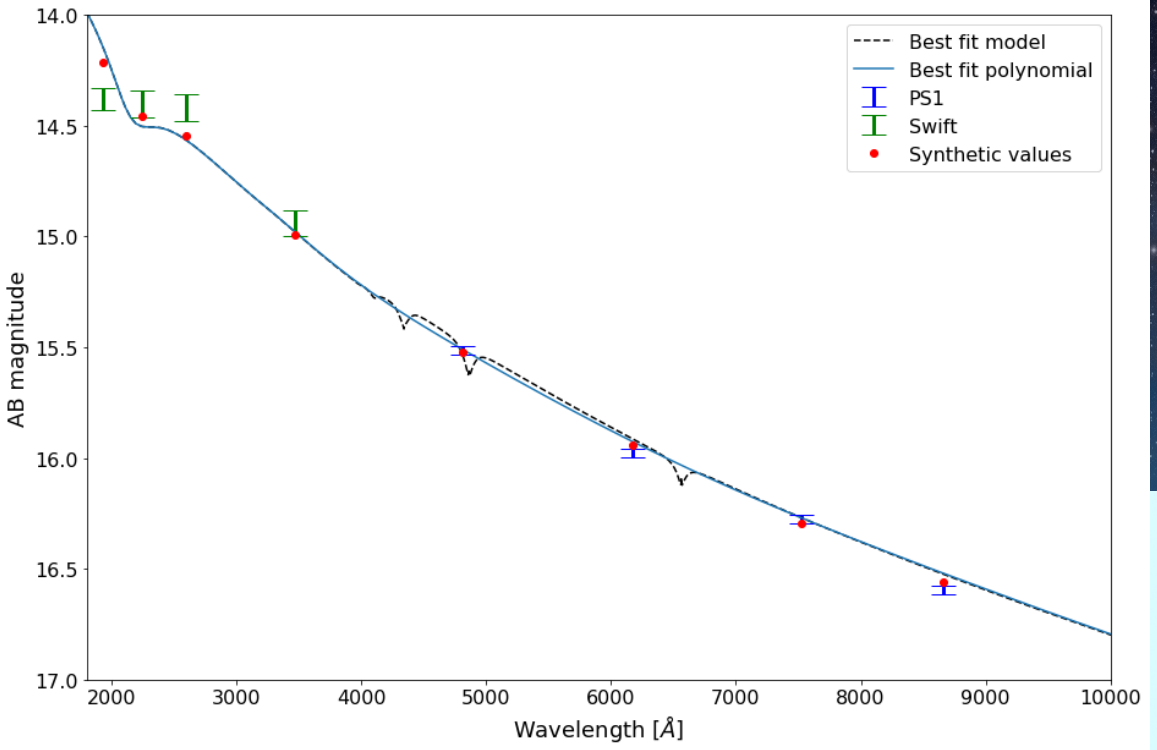
6.94 min period

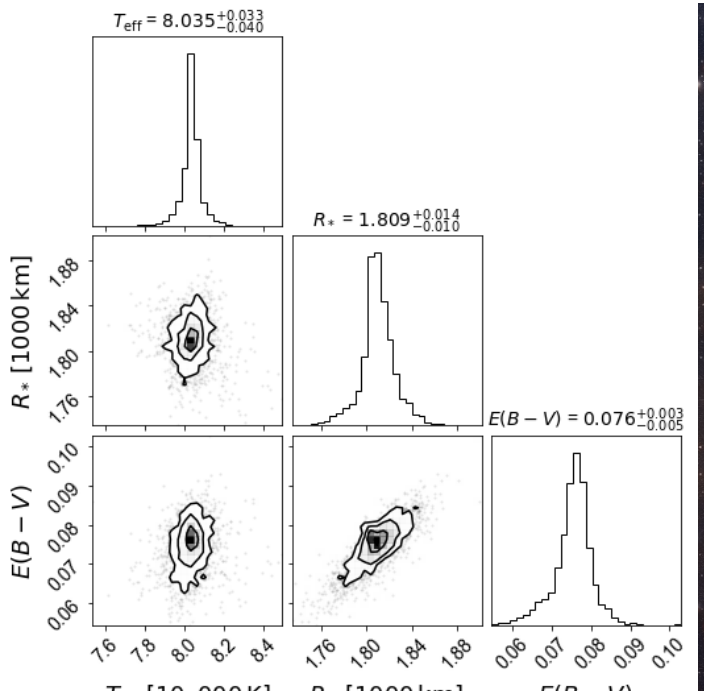

a)
b)
c)
d)
Normalised Flux (g')
Normalised Flux (r')
Normalised flux (ZTF-g)
Normalised flux (ZTF-r)
Phase
Phase

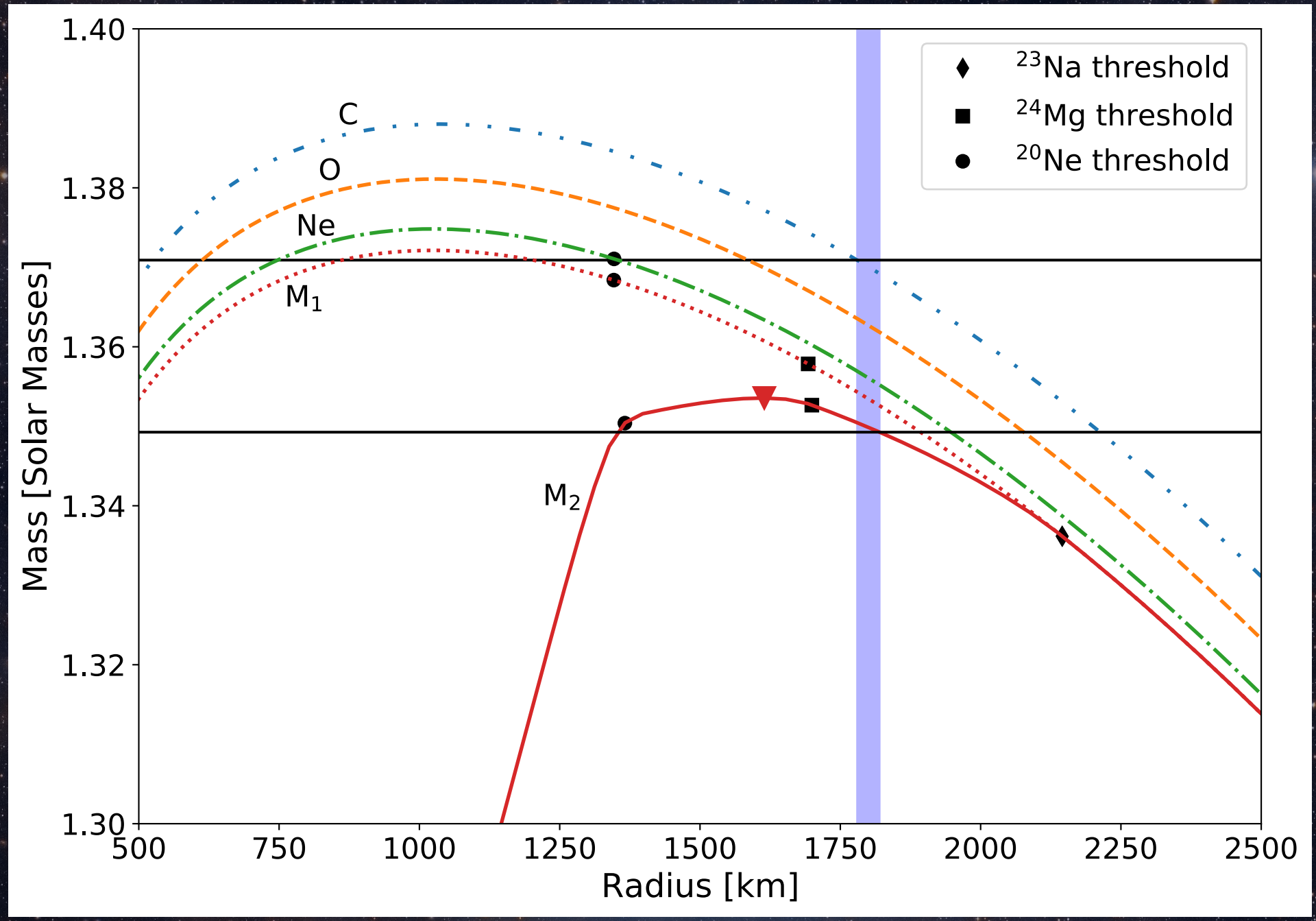

a)
b)
c)
d)
F_λ [10^{-15} erg s^{-1} cm^{-2} Å^{-1}]
B [100 MG]
λ [Å]
λ [Å]
1
2
3
4
5
6
7
8
9
10
11

Photometric fitting

- T_{eff} = 80,450 K
- R = 1810 km
- E(B-V) = 0.076






1.40
1.38
1.36
1.34
1.32
1.30
Mass [Solar Masses]
500
750
1000
1250
1500
1750
2000
2250
2500
Radius [km]
C
O
Ne
M1
M2
23Na threshold
24Mg threshold
20Ne threshold