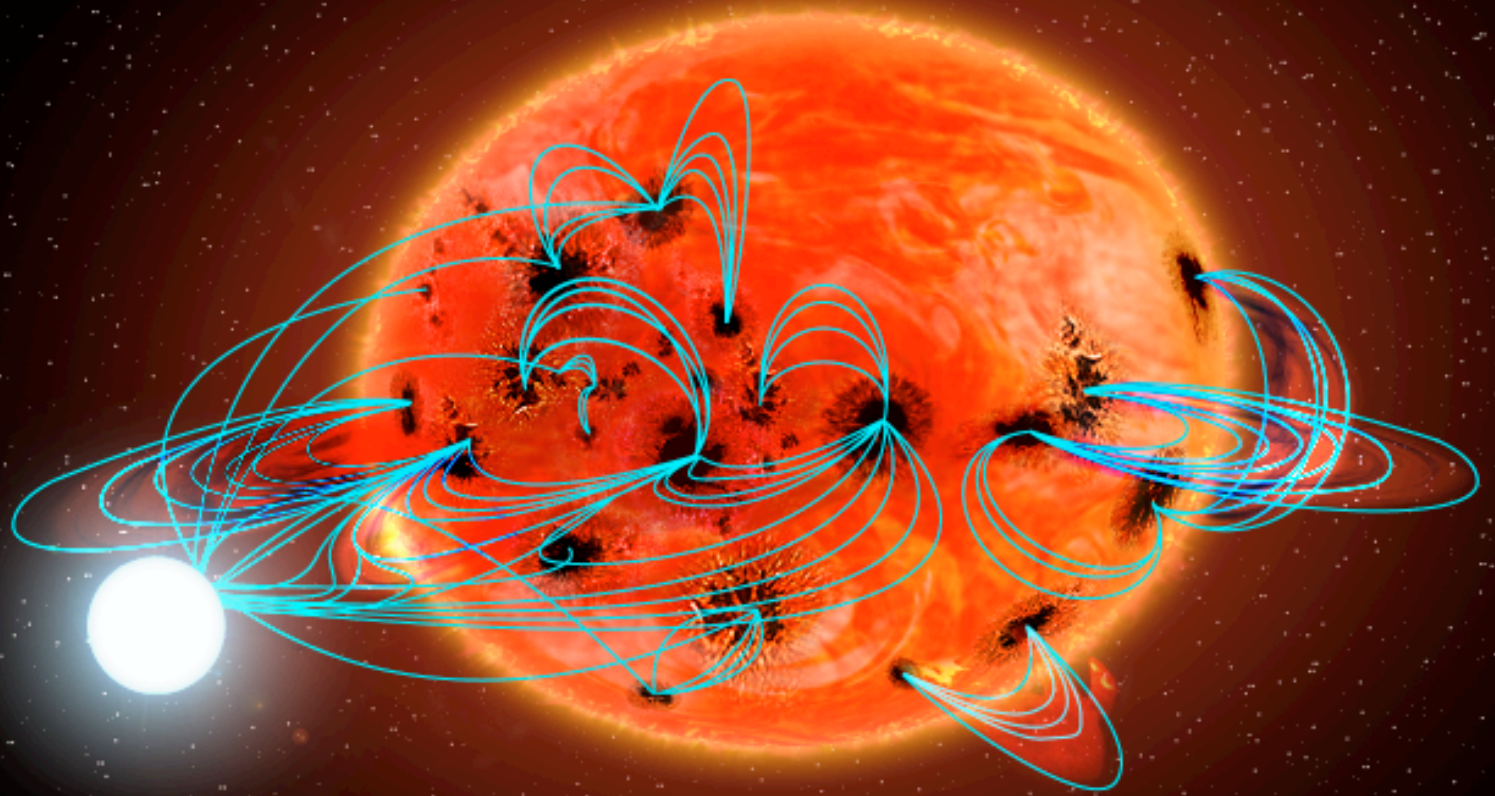


# GALEX & Optical Light Curves of LARPS



AAVSO November 7, 2009

Paula Szkody, Al Linnell, Richard Plotkin, Mark Seibert, Ryan Campbell, Tom Harrison,  
Steve Howell, Jon Holtzman

What the heck is a LARP?

**LARP = Low Accretion Rate Polar**

**Polar  $\dot{M}=10^{-11} M_{\odot}/\text{yr}$**

**LARP  $\dot{M}=10^{-14} M_{\odot}/\text{yr}$**

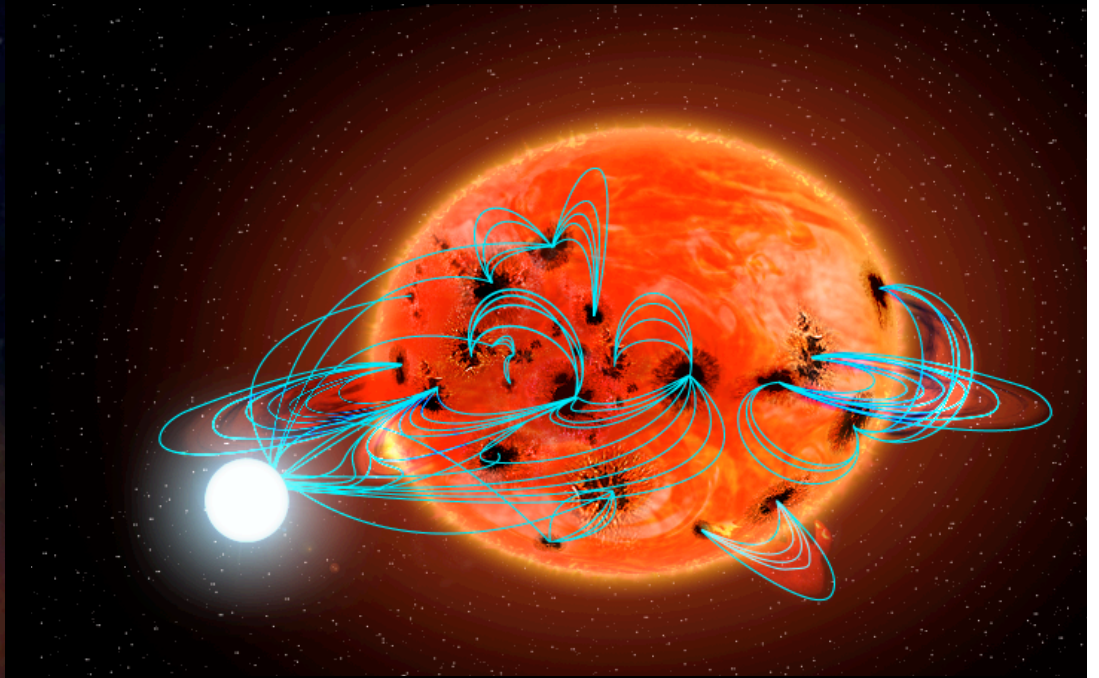
WD temperature in Polars  $\sim 11,000\text{-}14,000\text{K}$

WD temperature in LARPS  $< 10,000\text{K}$

Polar



LARP



**The theory:**

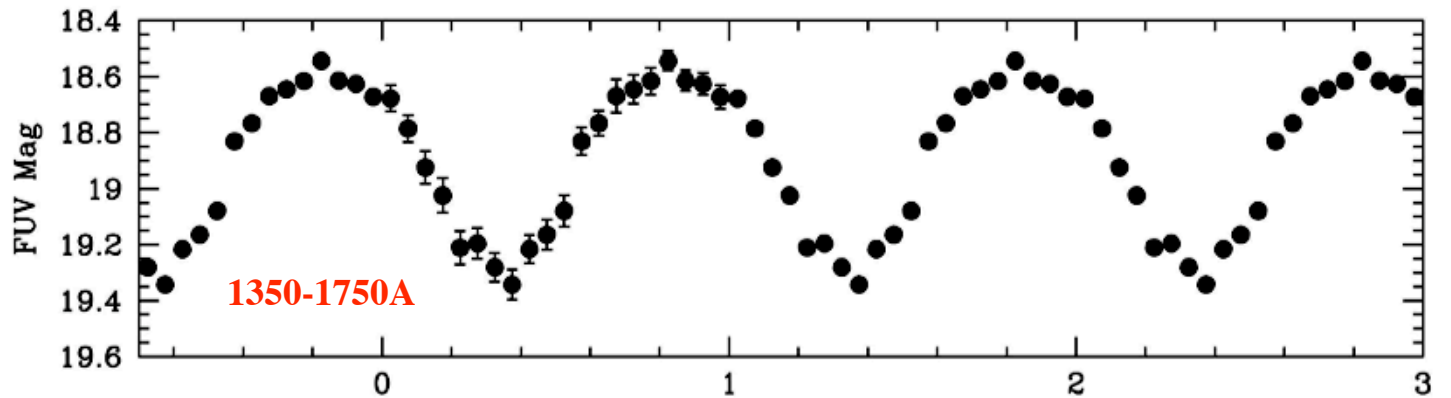
**If there is little to no accretion,  
the white dwarf should be a  
uniform temperature and the UV  
light curve should be a flat line.**

# The Reality:

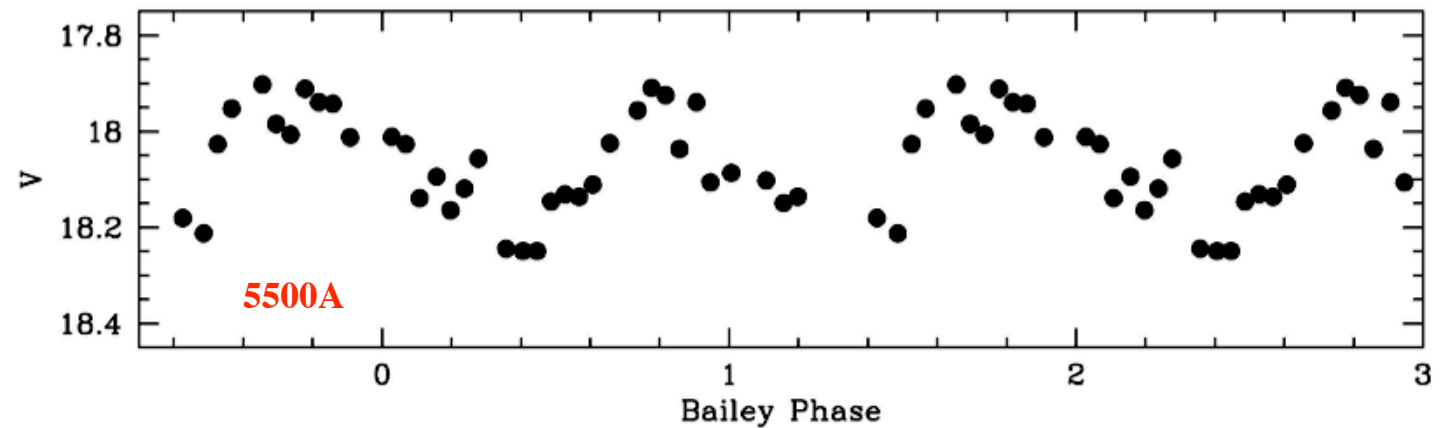
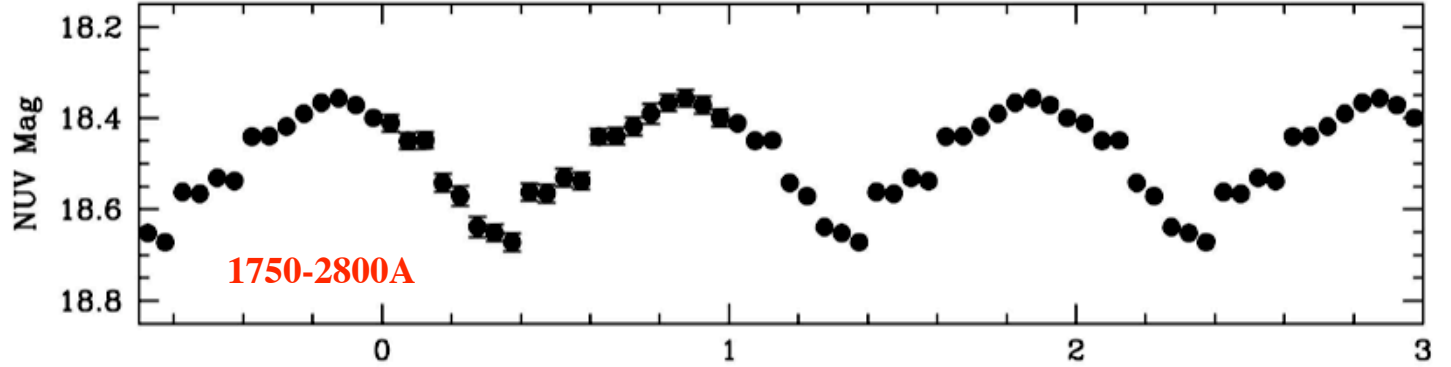
P=81 min

B=14MG

Szkody,  
Harrison,  
Plotkin,  
Howell,  
Seibert,  
Bianchi, Ap,  
646, L147, 2006



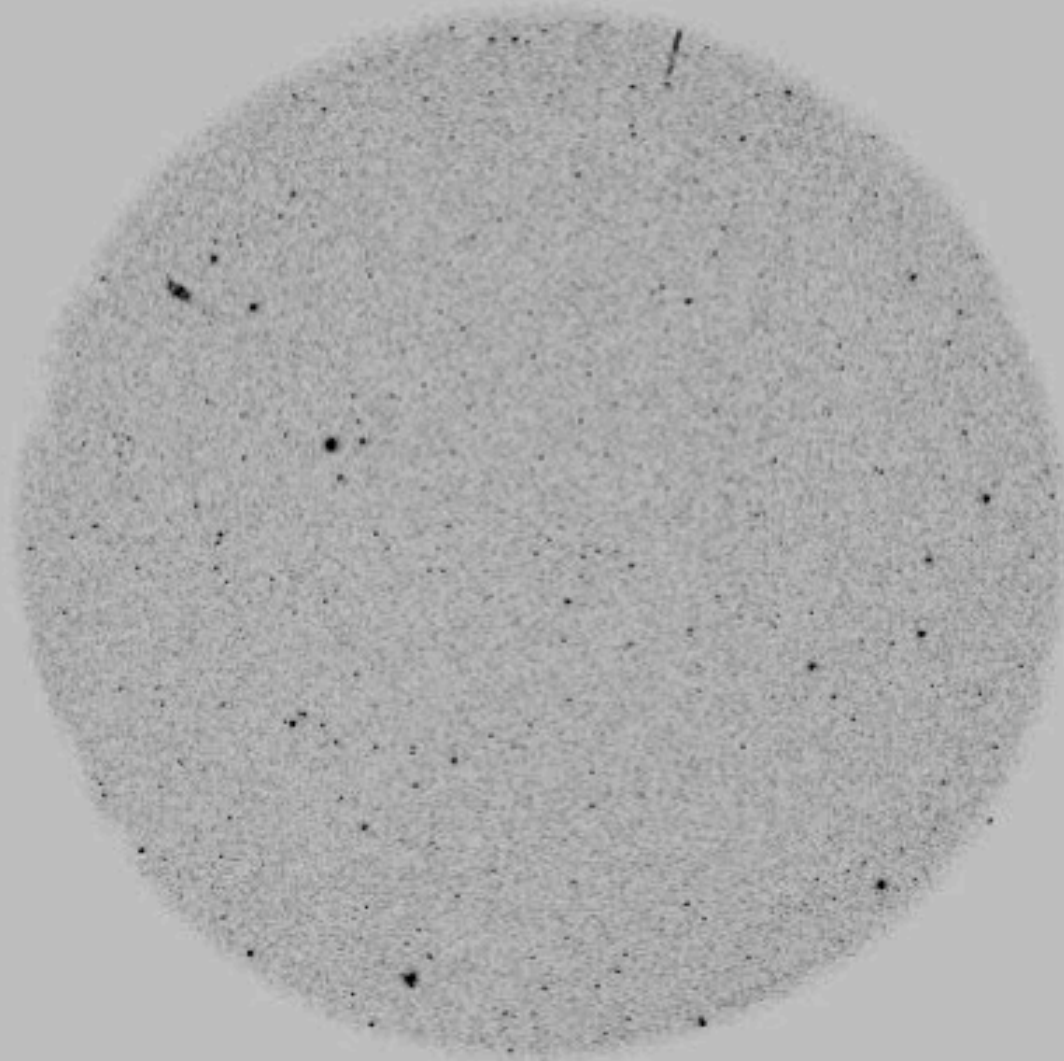
## EF Eri with GALEX



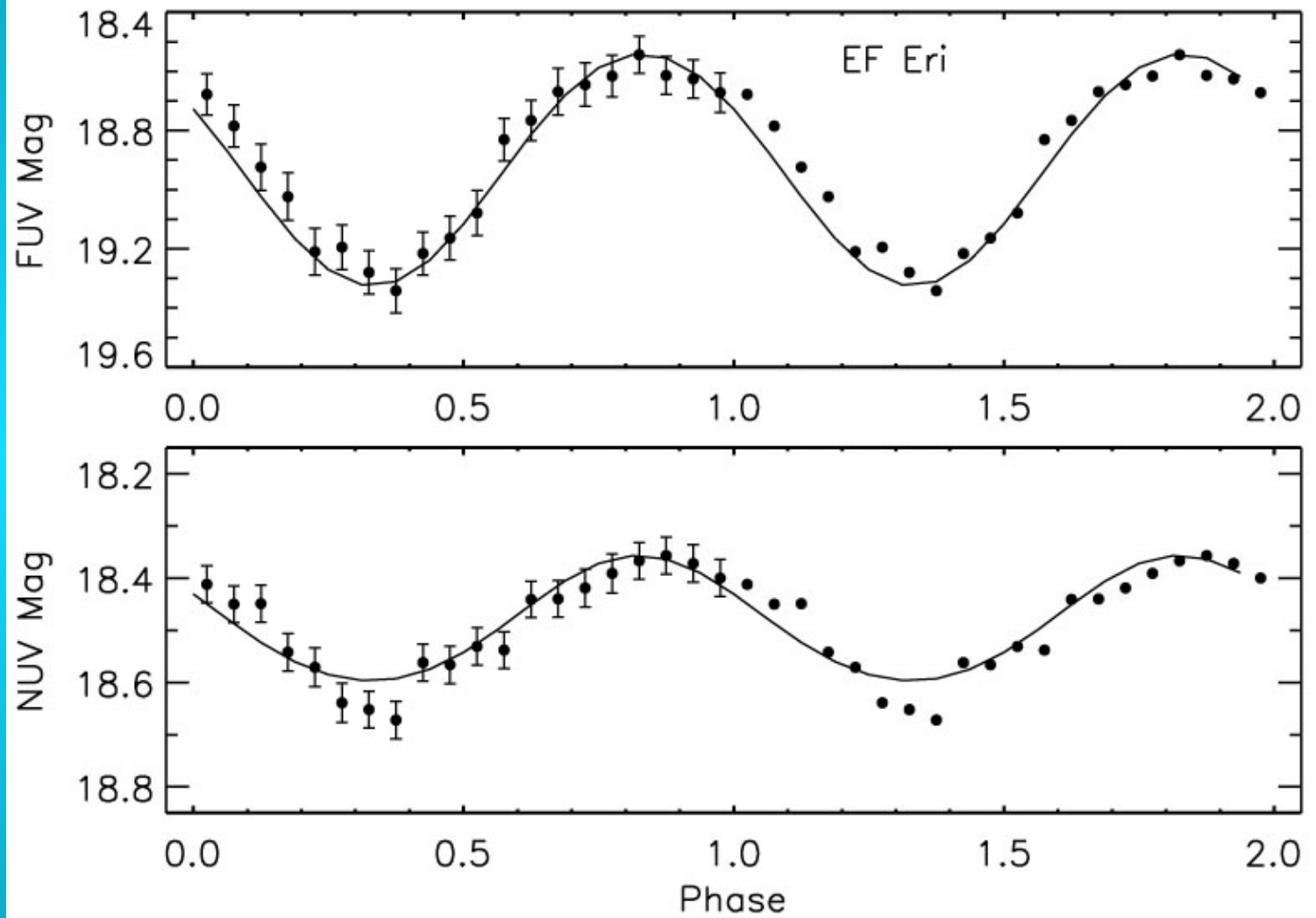


**GALEX  
NUV  
(1750-2800Å)**

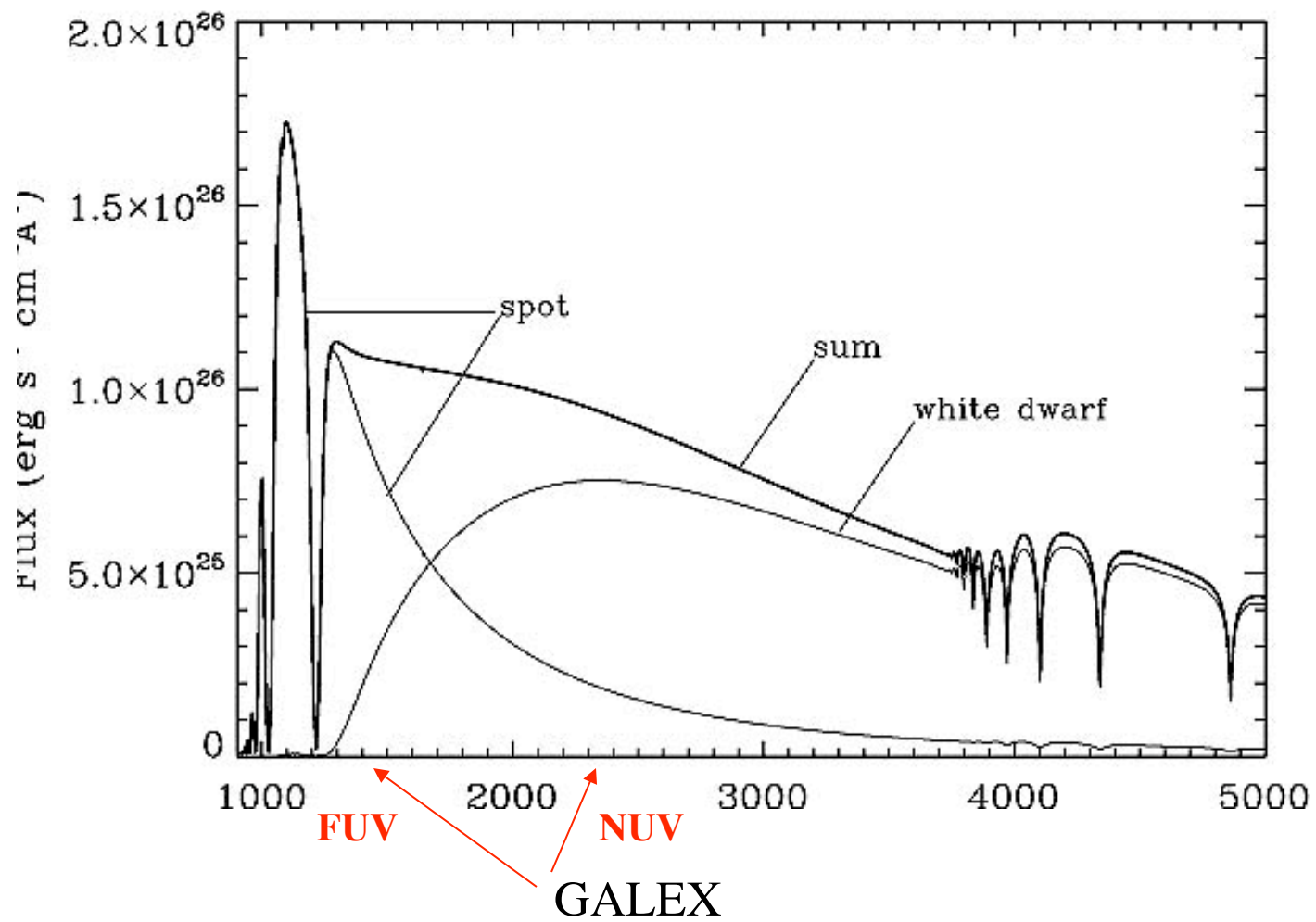
**EF Eri**

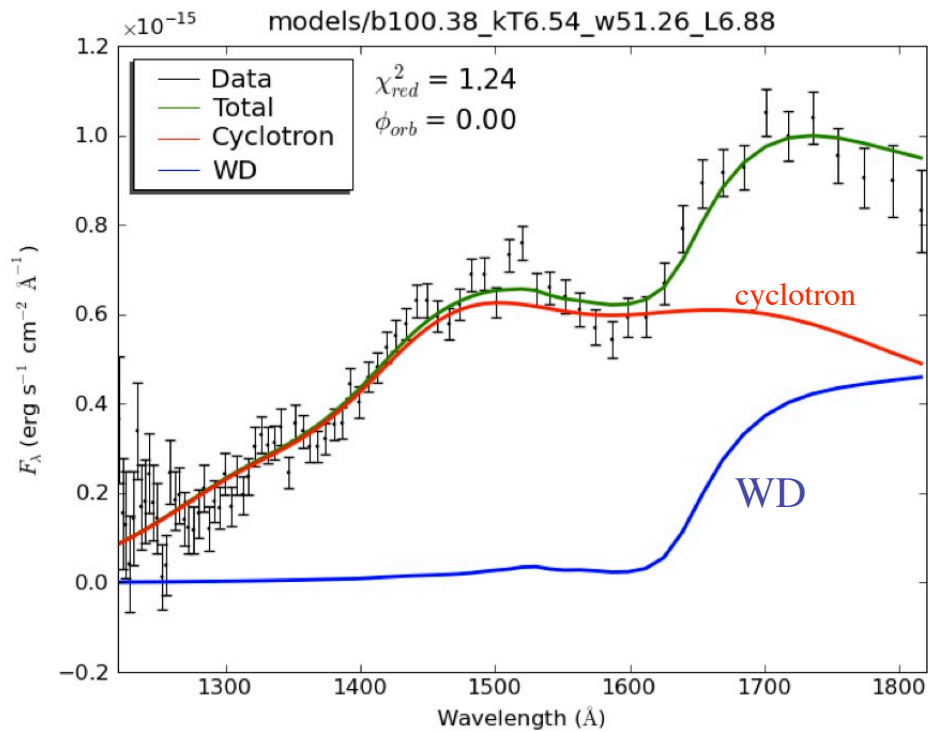


Modeled with  
9500K WD and  
24,000K spot

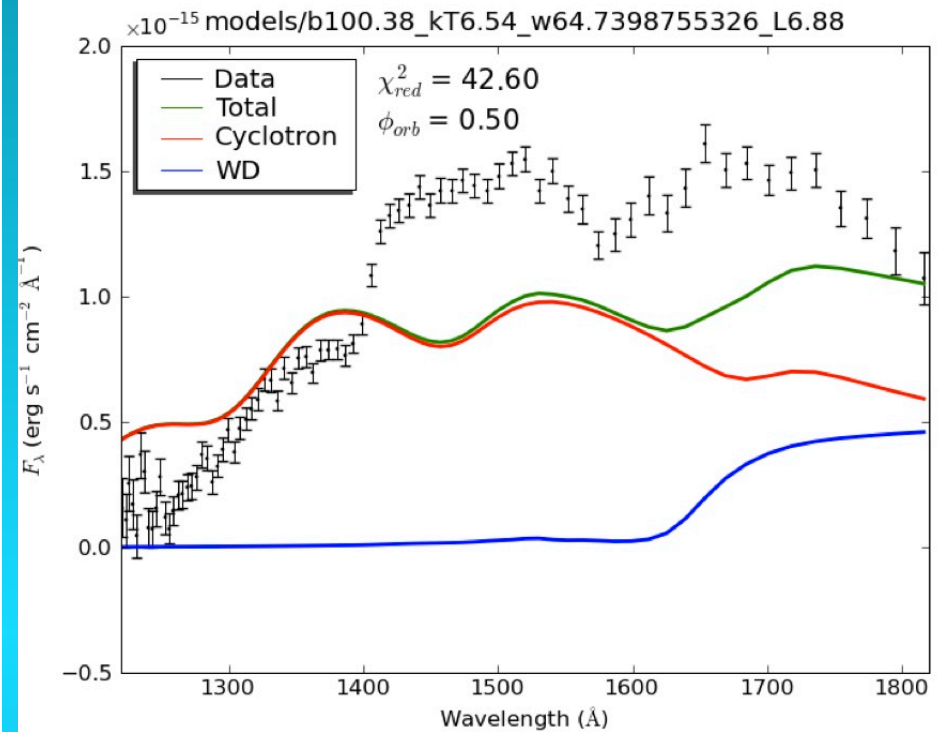








Phase minimum light



Phase maximum light

Need another component

Ryan Campbell's cyclotron models  
with  $B=100$  MG

**So, is the orbital variation due to:**

- 1) A hot spot on the white dwarf**
- 2) Cyclotron at a high field**

**????????**

Obtained GALEX data on 3  
more systems with different  
magnetic fields and secondaries

spots

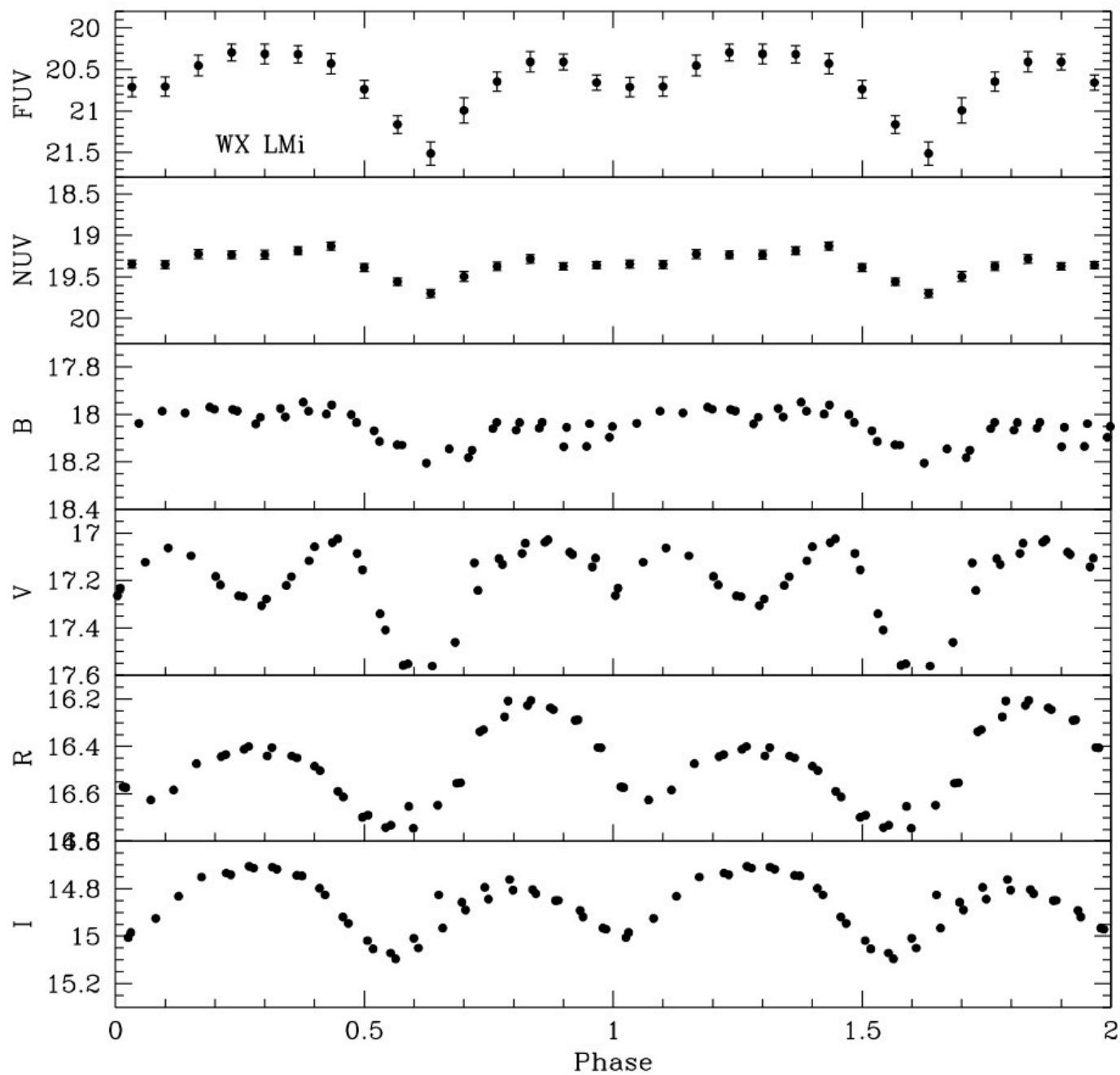
P=2.8 hrs

B=61,70 MG

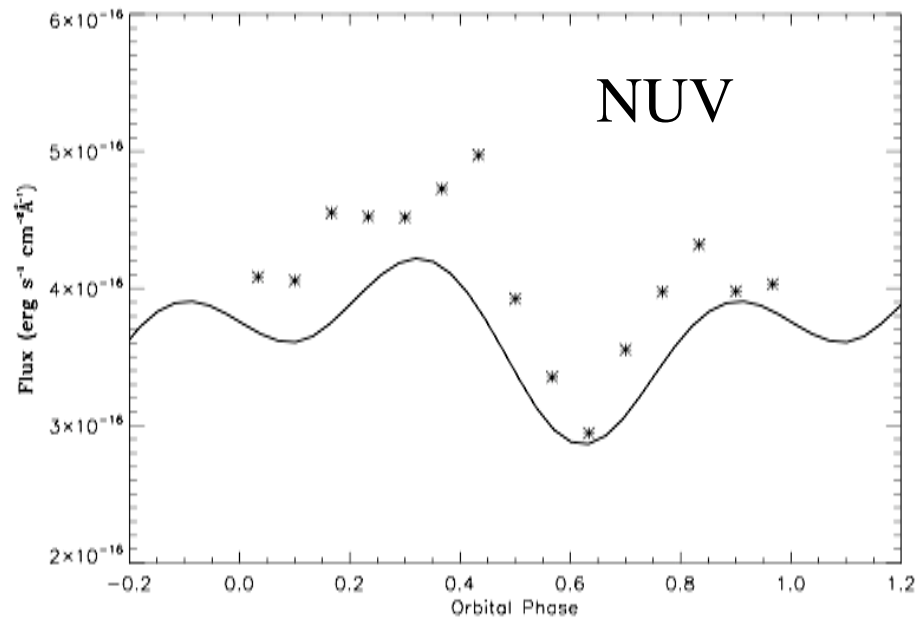
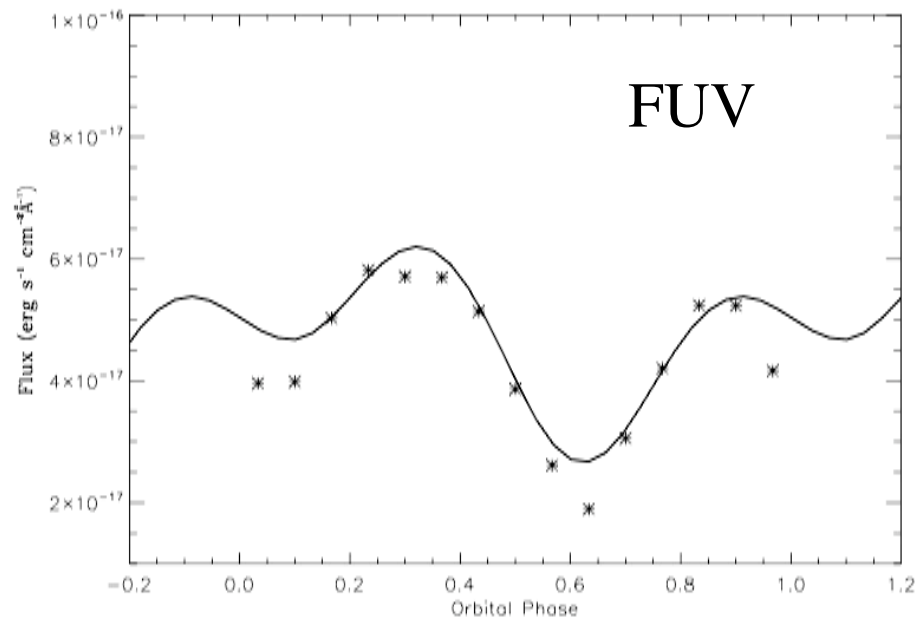
Sec=M4.5

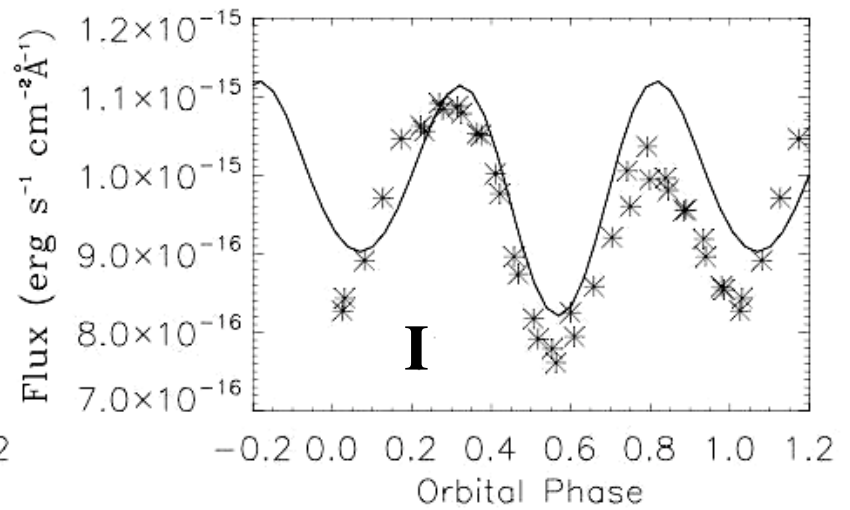
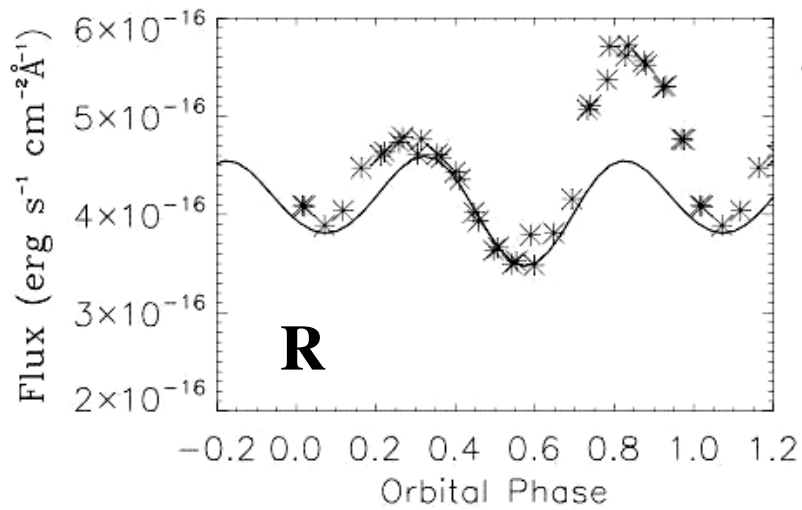
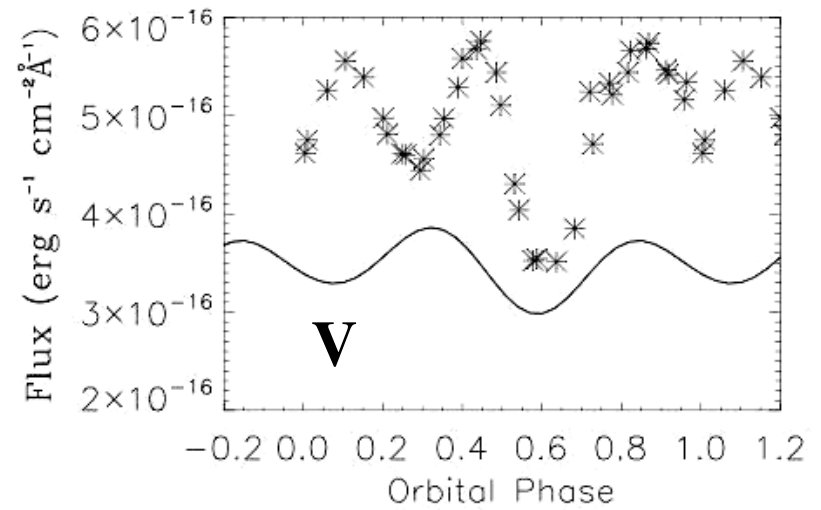
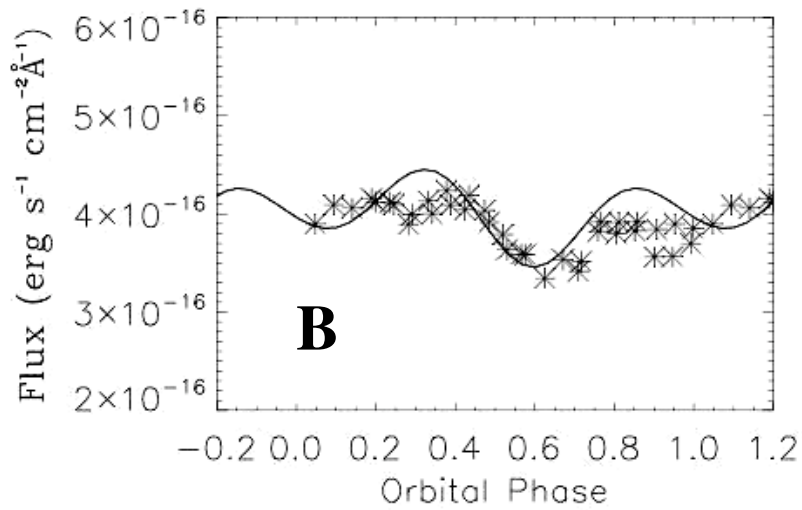
cyclotron

M star

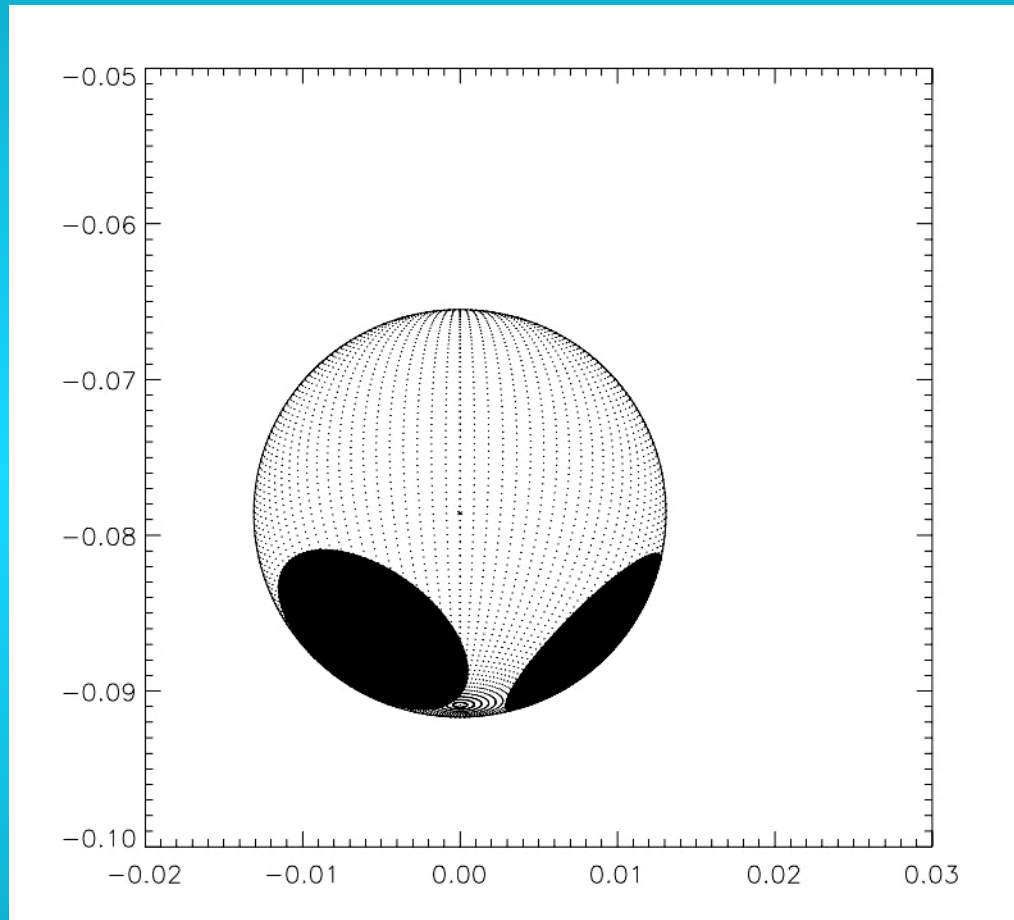


Al Linnell  
modeled with  
7900K WD with 2  
10,000K spots





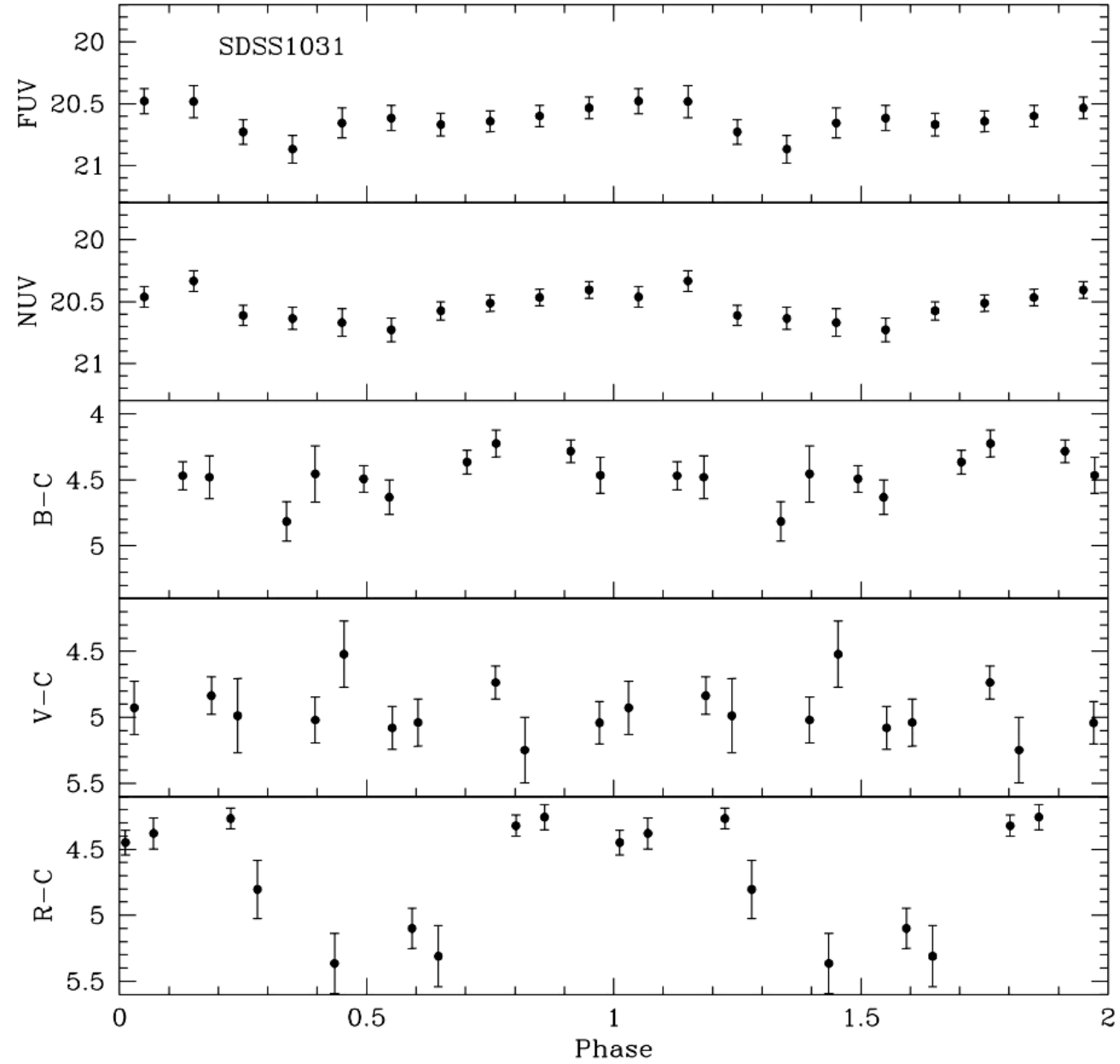




P=1.37 hr

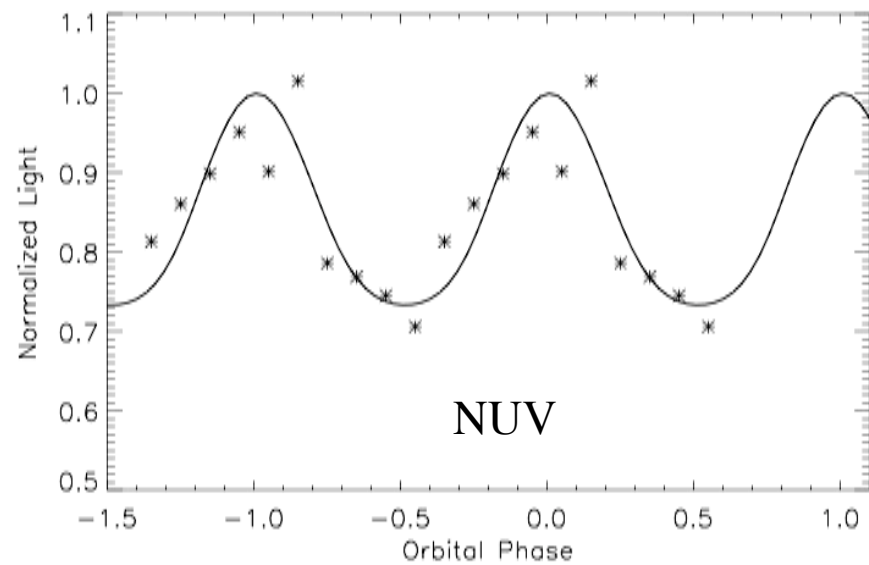
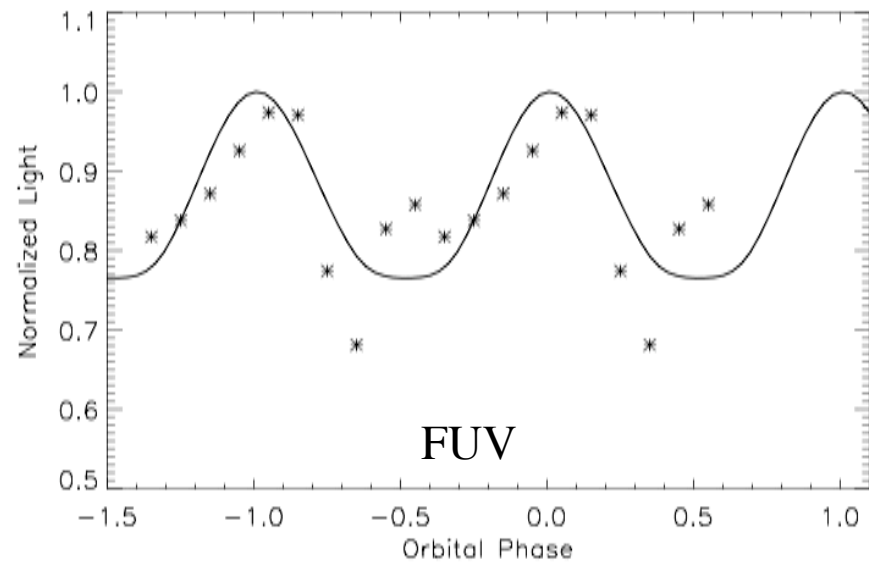
B=42 MG

Sec=>M6



V=18.3

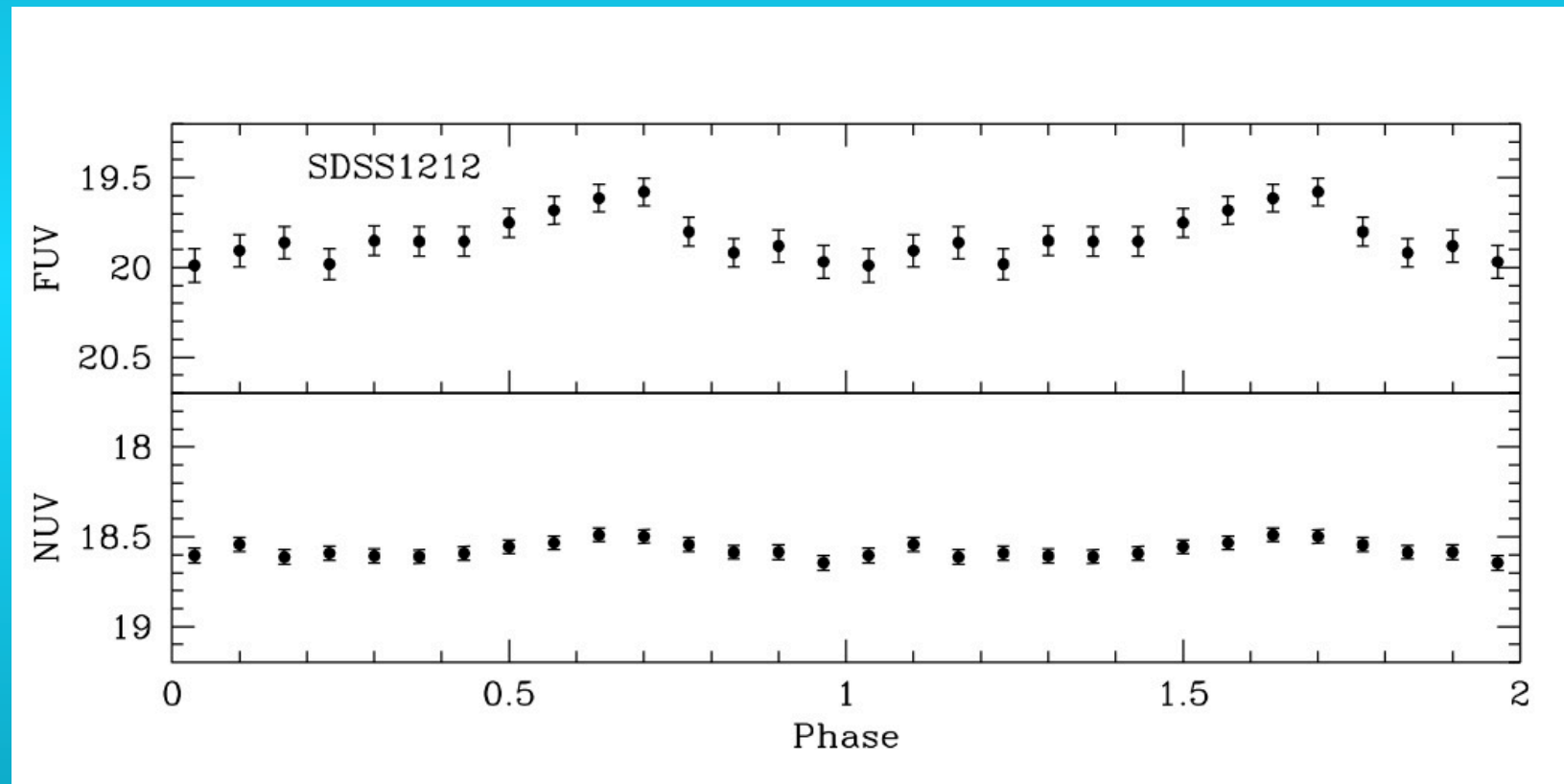
Modeled with  
9500K WD with  
one 13000K spot



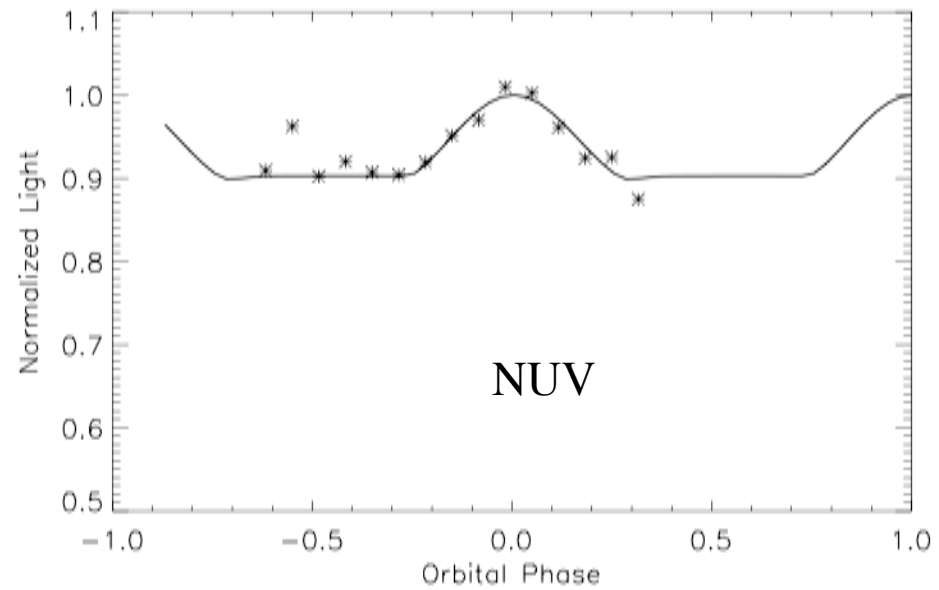
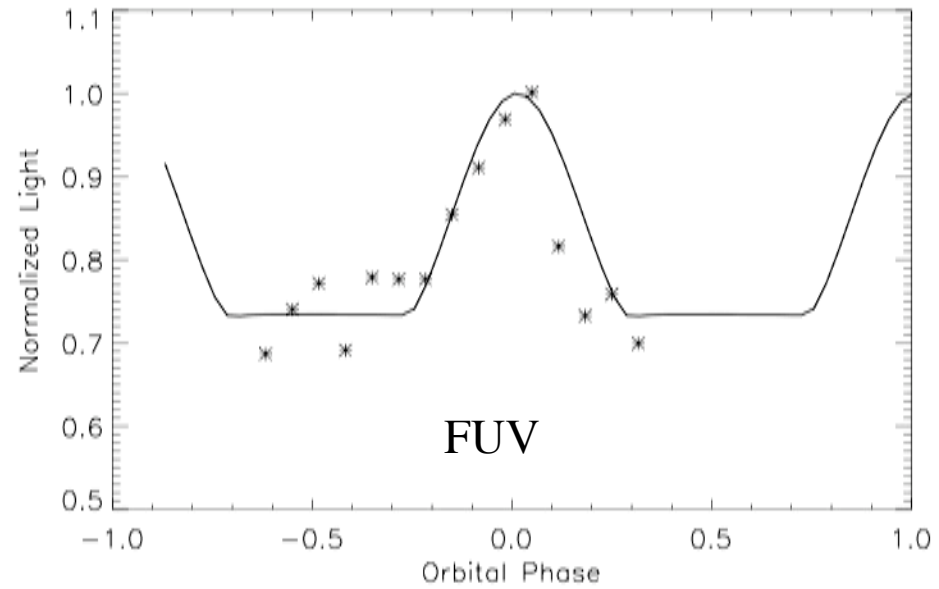
P=1.47 hr

B=7 MG

Sec => L5 brown dwarf



Modeled with  
9500K WD with  
single 14000K spot



# Conclusions

- all WDs have enhanced emission even with no direct mass transfer
- fields of 7-70 MG are enough to funnel wind from secondary
- even system with brown dwarf secondary provides some wind
- 10,000-14,000 spots can approximate light curves but does not rule out cyclotron