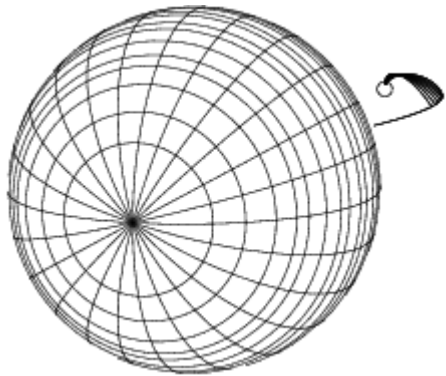
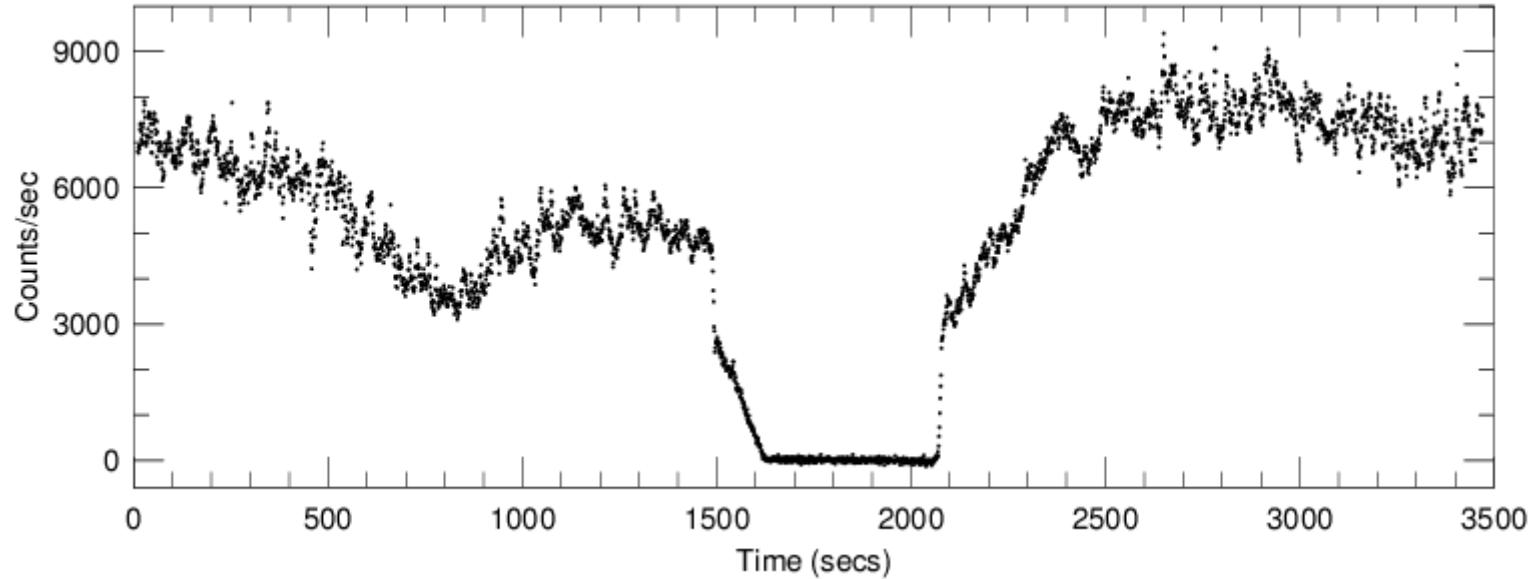


Highest-field, synchronised case

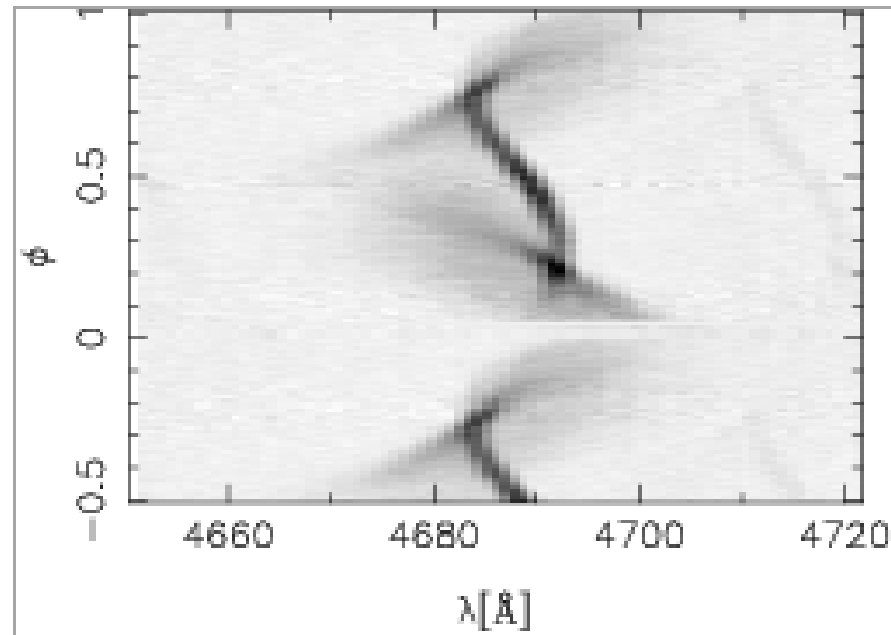
# HU Aqr



Eclipses trace accretion flow

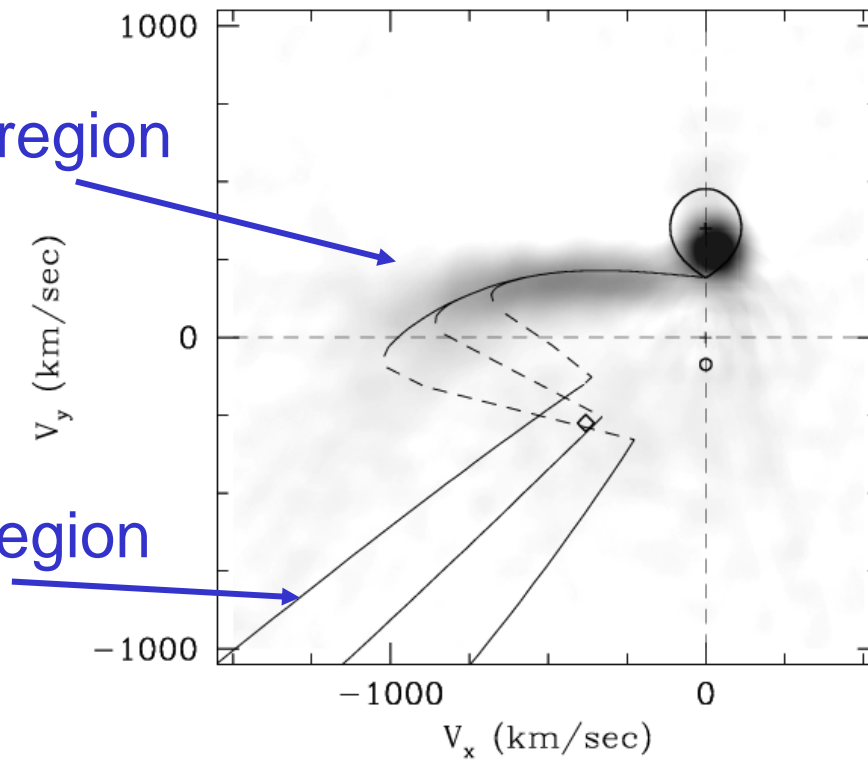
- ballistic region
- magnetically channelled region
- very small footprint  $10^{-5}$  of wd

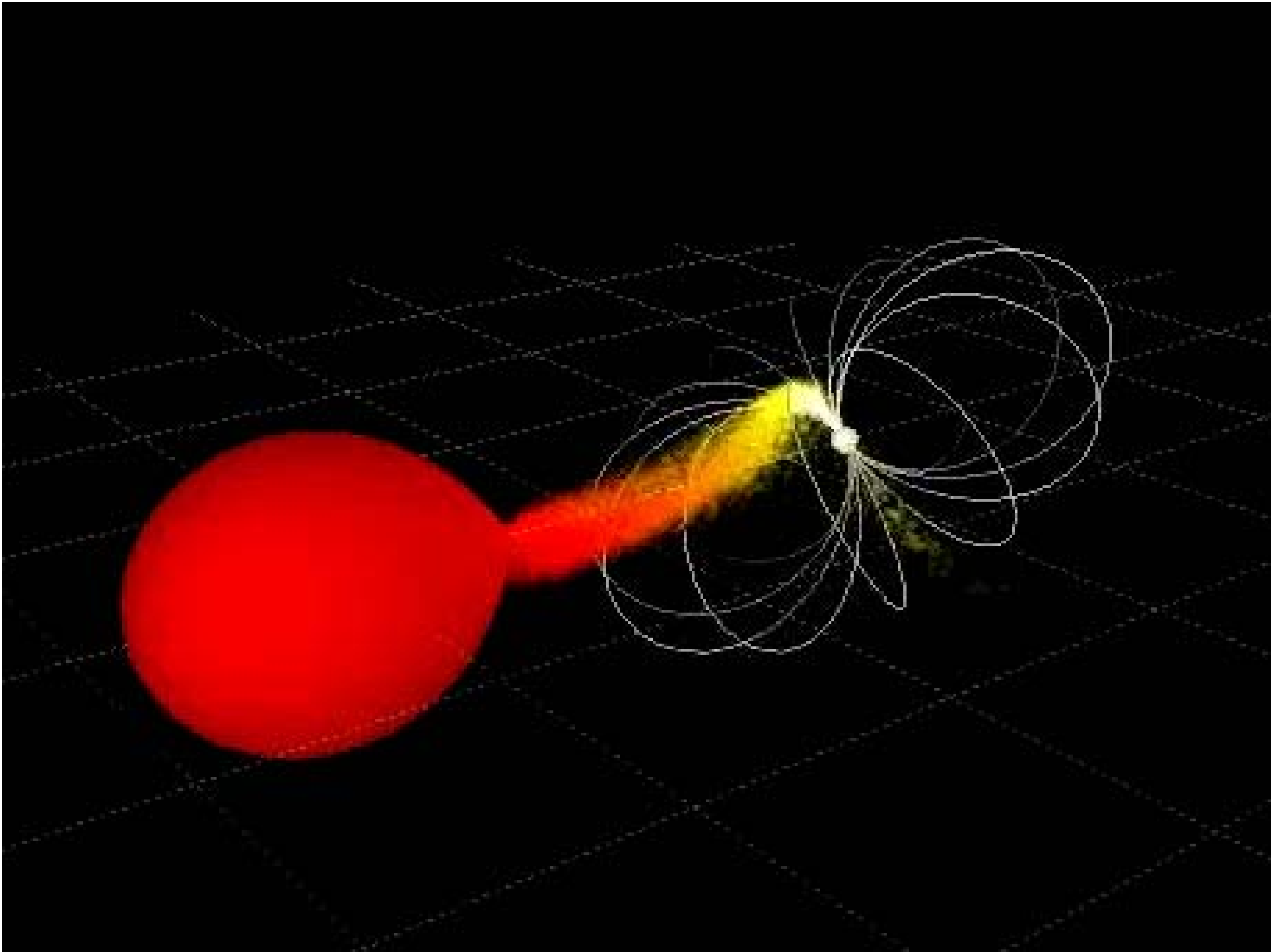
HU Aqr  
(Schwope et al)



Ballistic region

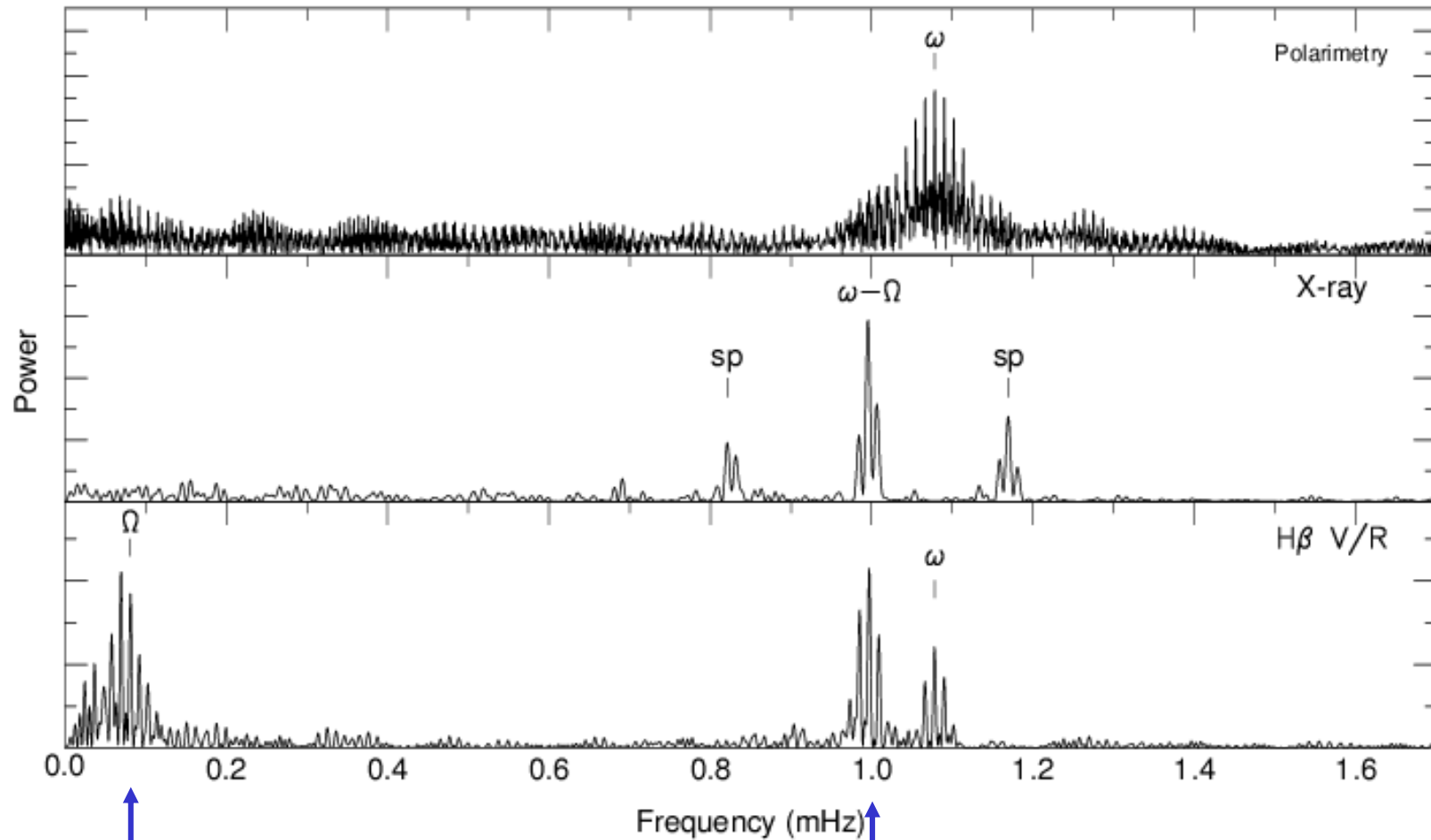
Magnetic region





V2400 Oph

WD spin (polarimetry)



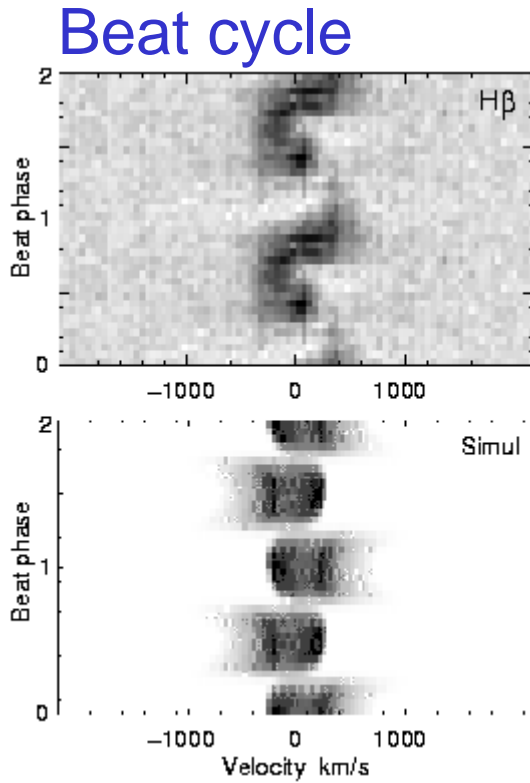
Orbit

(Buckley et al 1997;  
Hellier 2001)

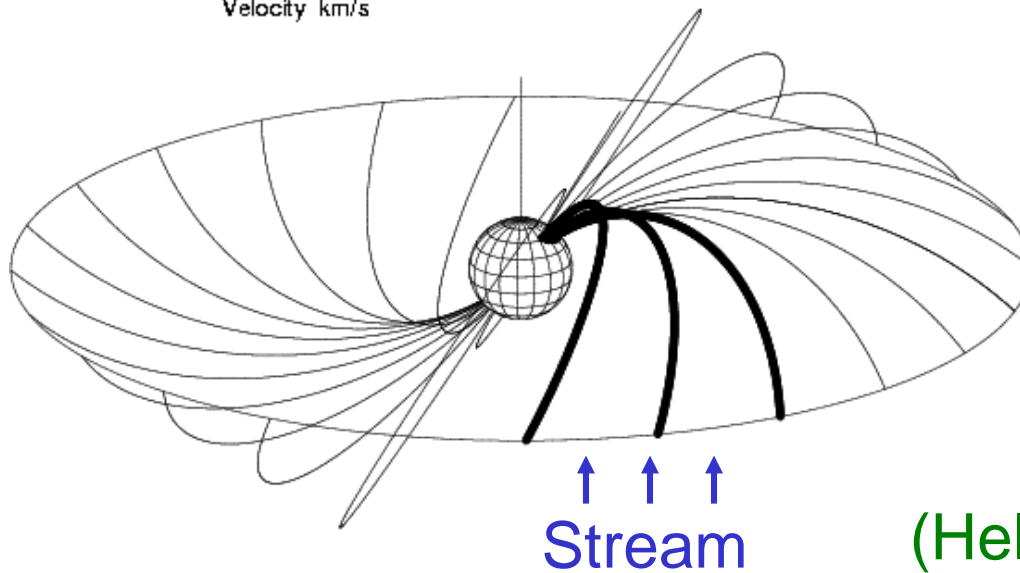
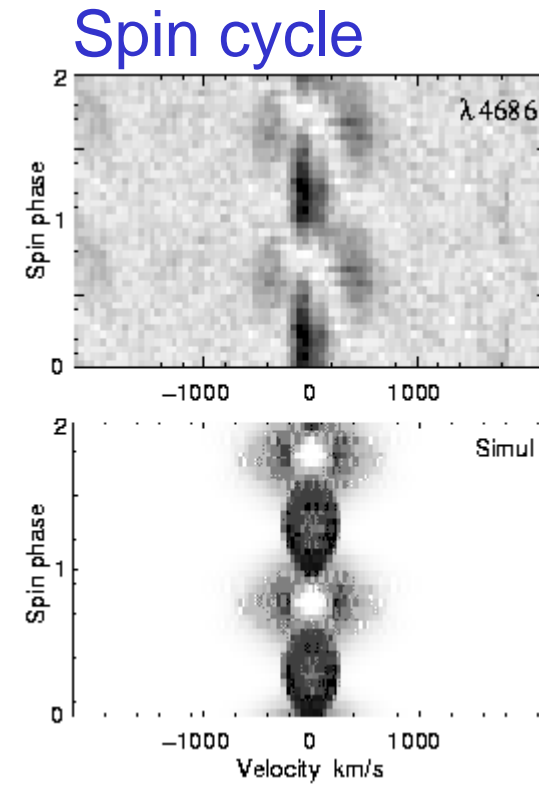
Beat (spin-orbit) freq  
(X-rays and emission lines)

# V2400 Oph

Simulation Data

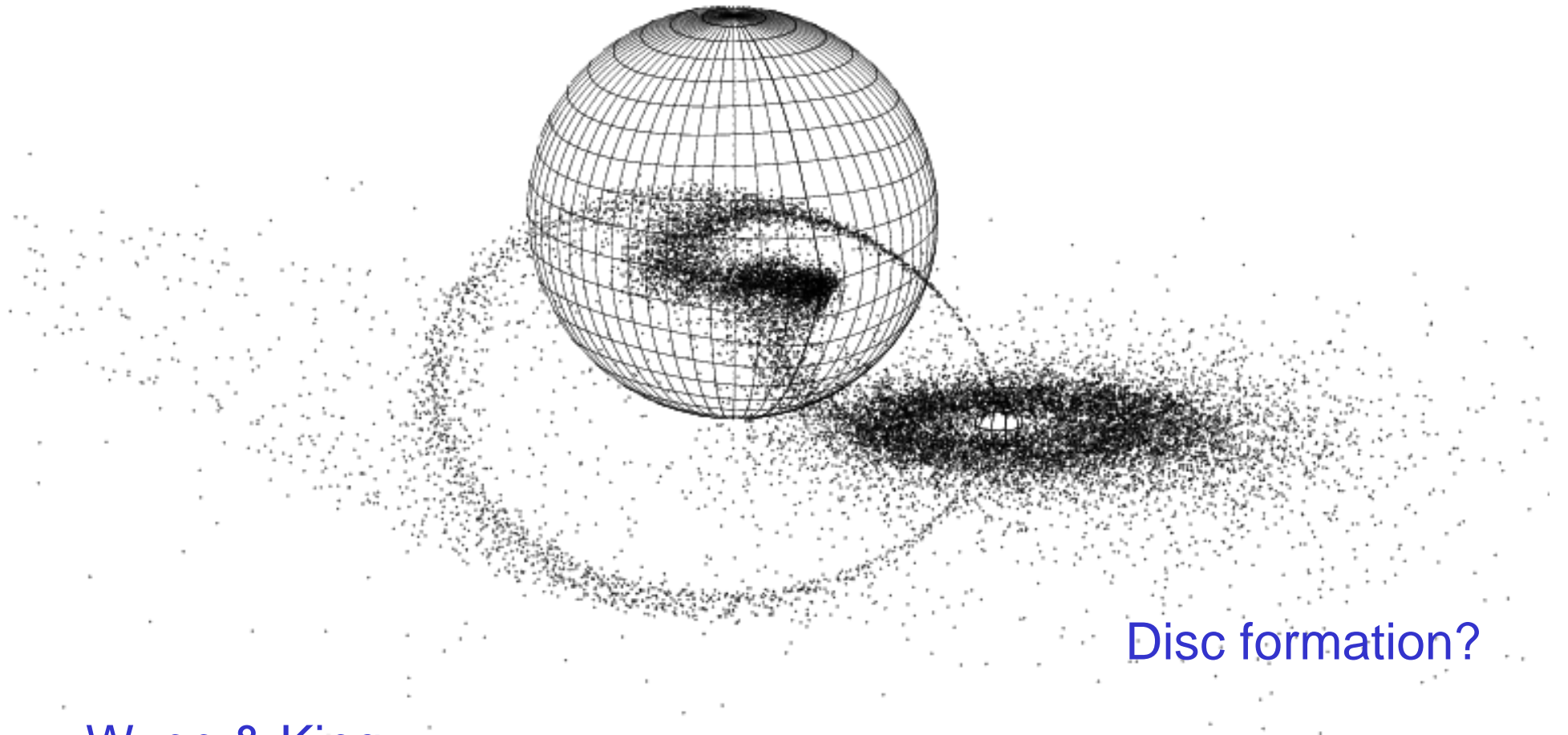


Simulation Data



Simple model:  
feed field lines  
“beneath” stream

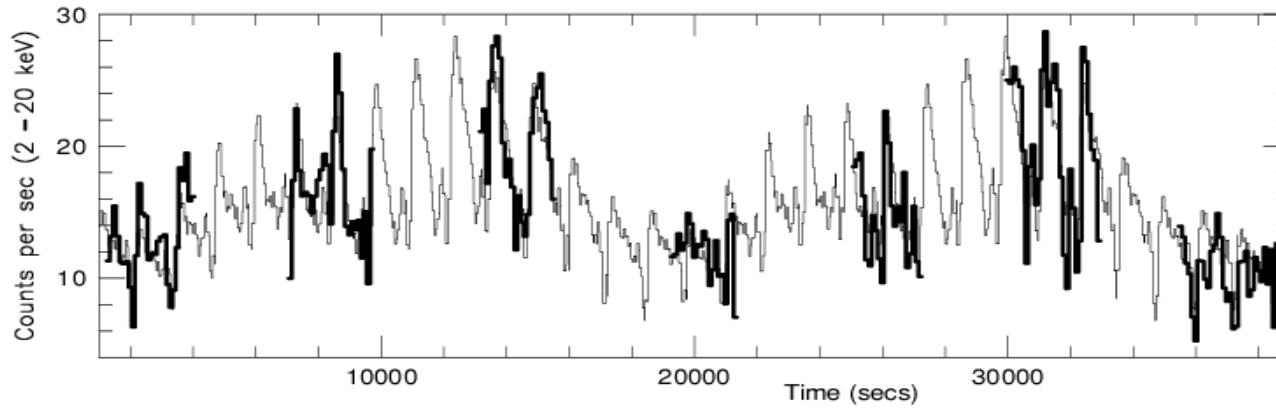
(Hellier & Beardmore 2002)



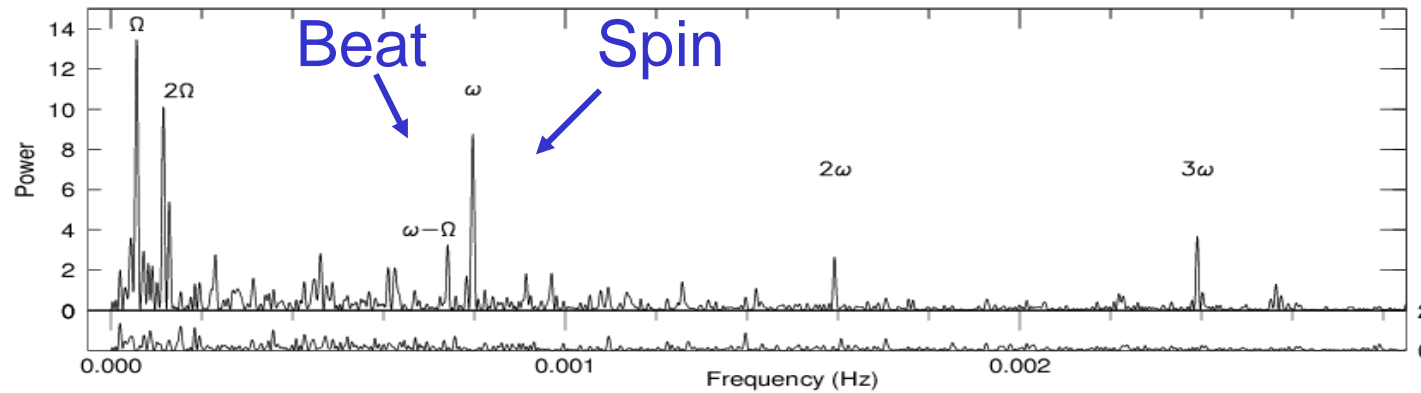
Disc formation?

Wynn & King  
-- diamagnetic blob model

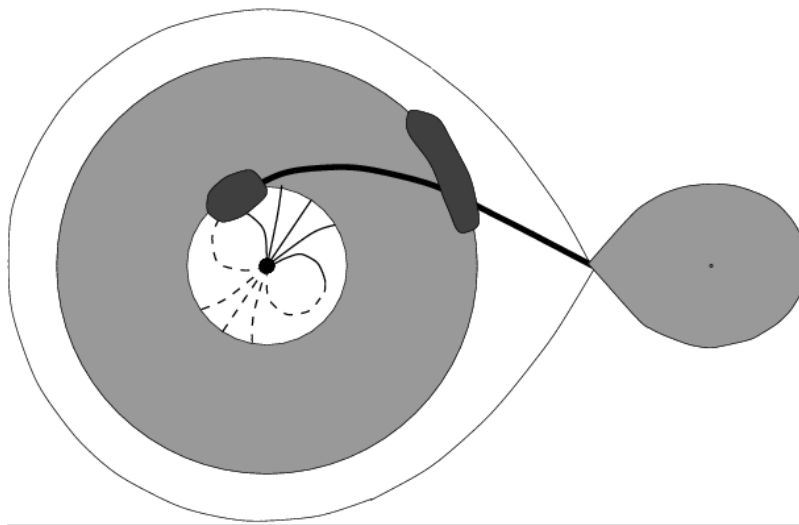




FO Aqr  
X-ray lightcurve



Fourier  
Transform



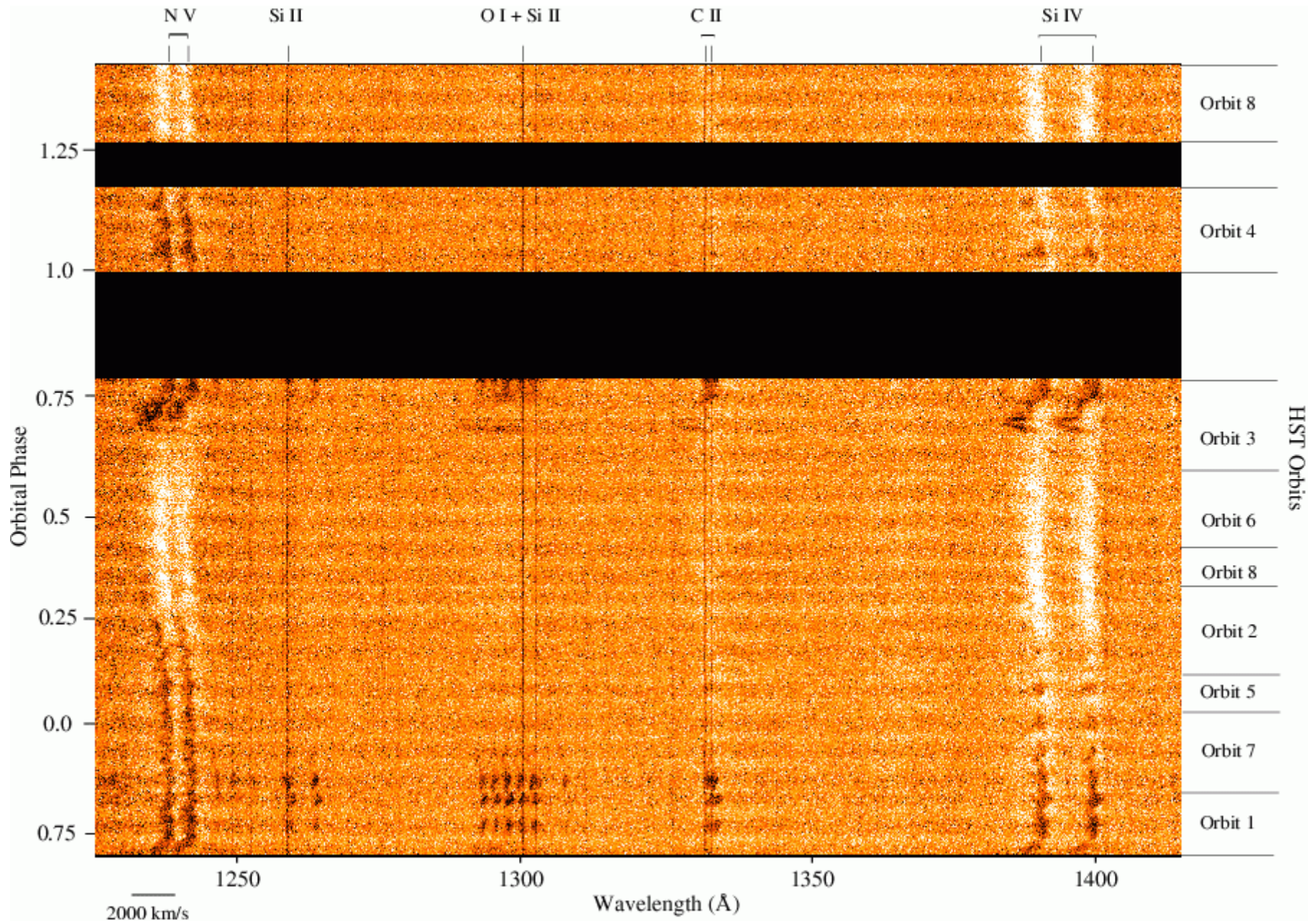
Disc-overflow accretion:

Mostly disc-fed

==> spin pulse

Some stream feeding

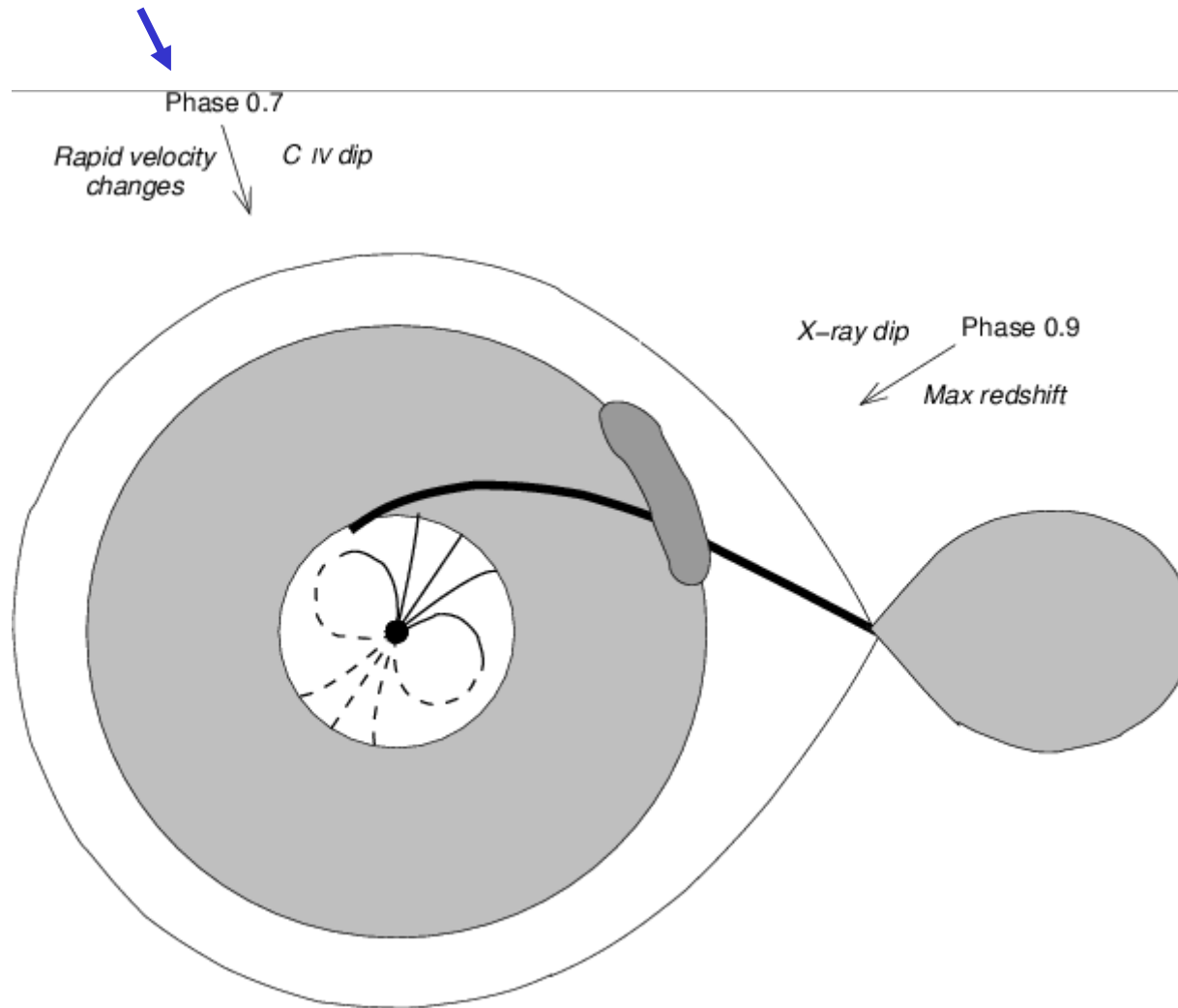
==> beat pulse



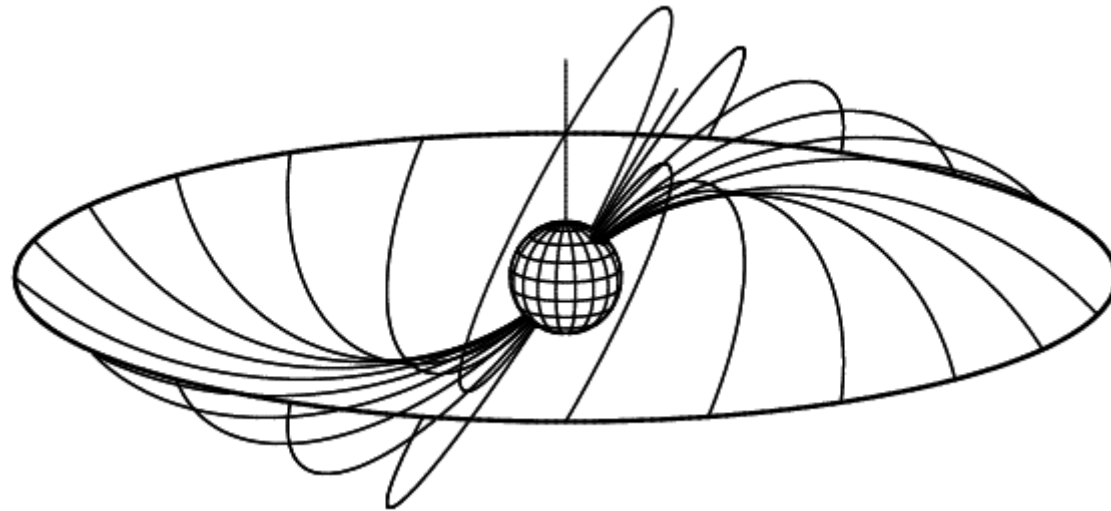
AO Psc: UV lines (HST)

Hellier & van Zyl 2006

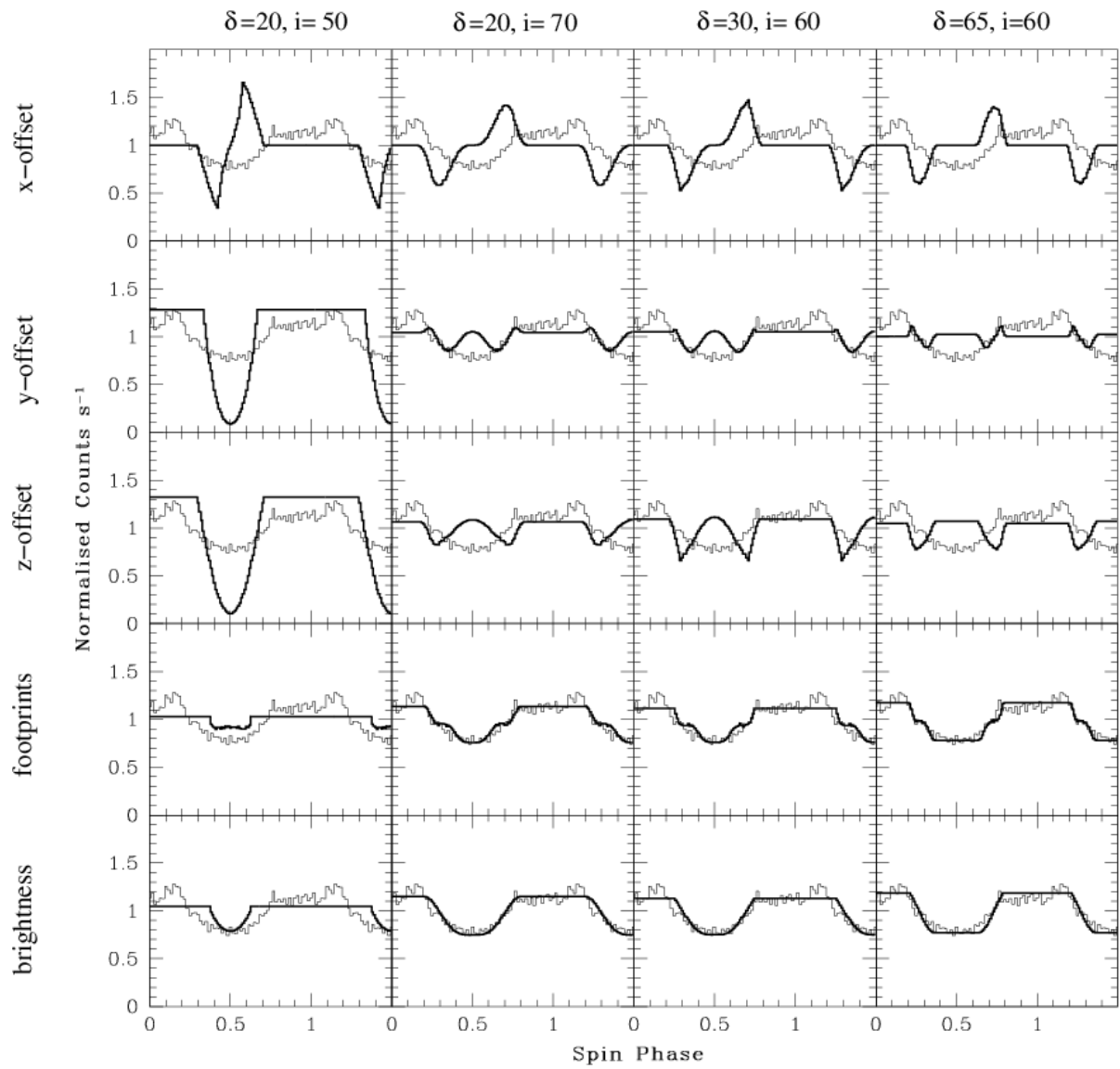
# Absorption seen at this phase



Do we understand the disc--field interface?



Does the disc distort the field lines?

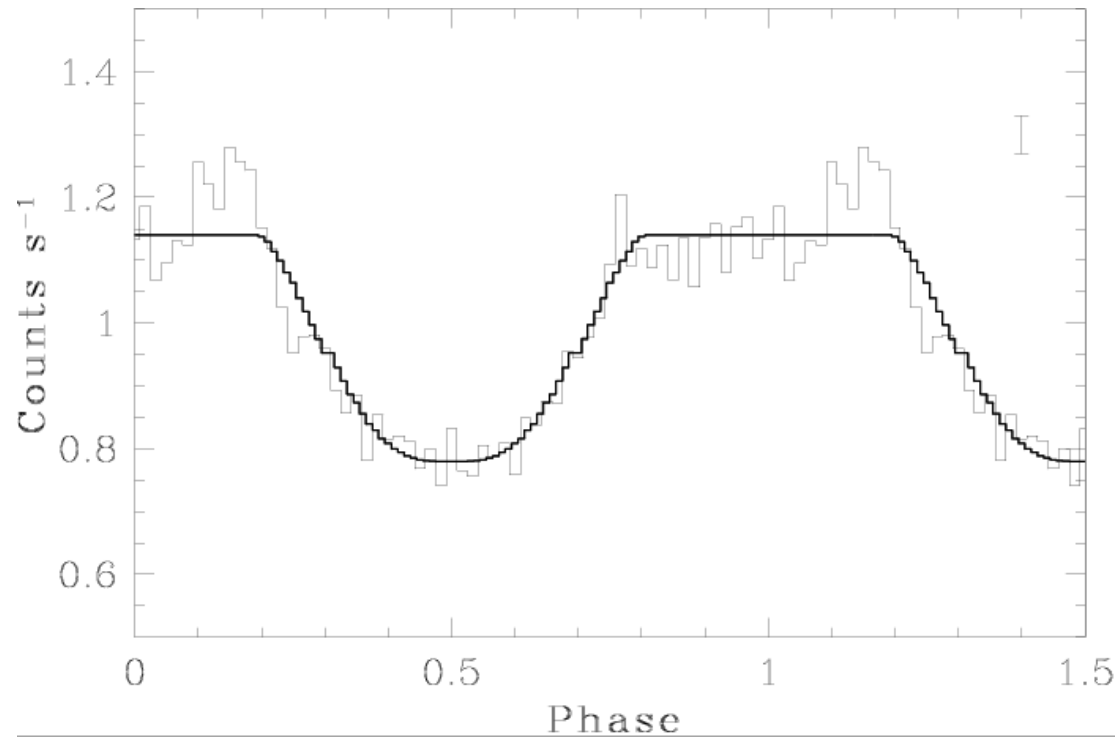


Modelling HT Cam's X-ray lightcurve using accretion footprints.

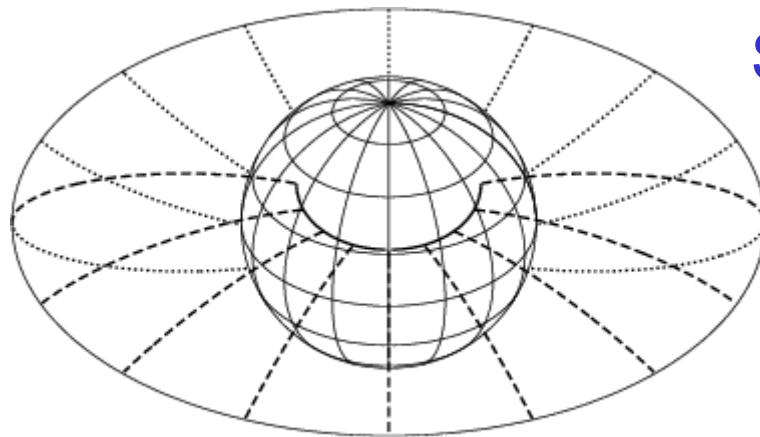
HT Cam: simplest case: no absorption in X-ray spin pulse!

Evans & Hellier 2005



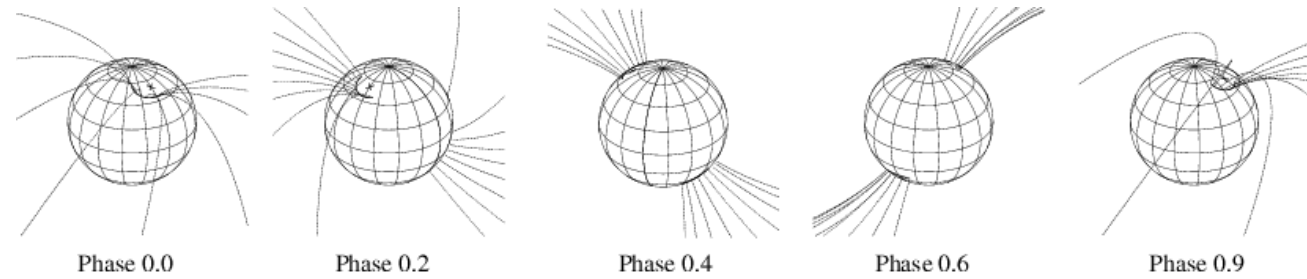
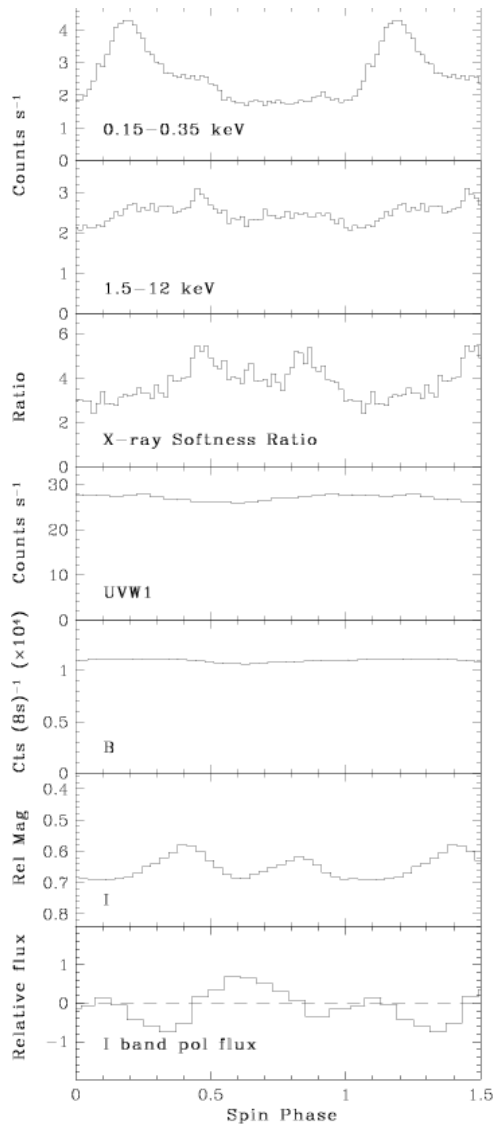


Best fit to HT Cam  
X-ray spin pulse



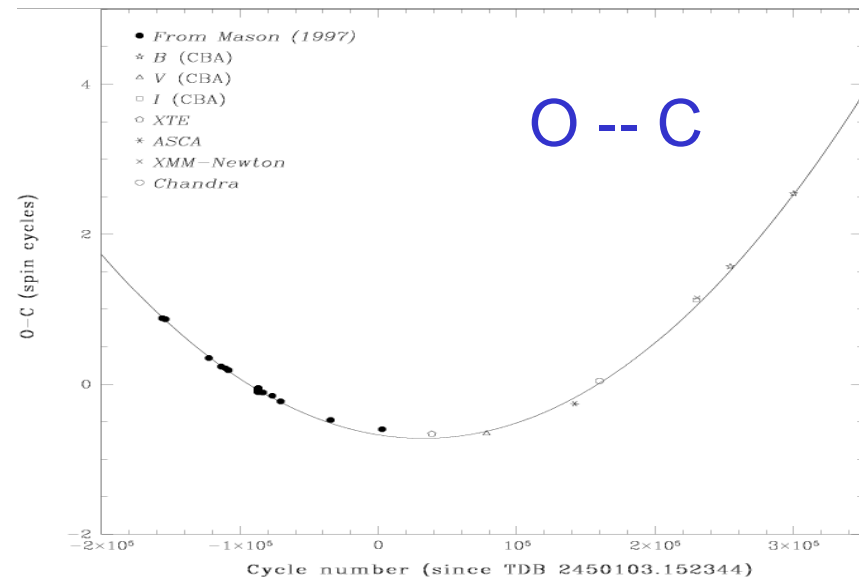
Simple un-twisted geometry

Evans & Hellier 2005

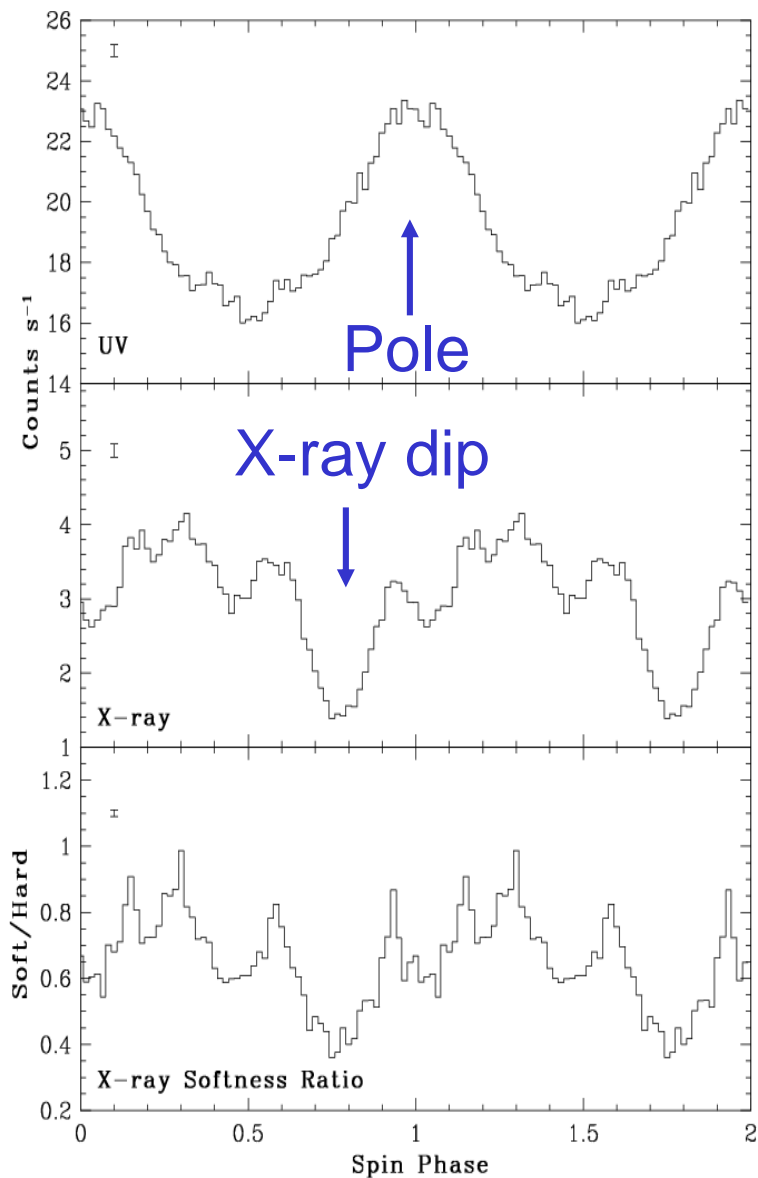


PQ Gem: accreting field lines **precede** pole & white dwarf is spinning **down**

(Evans, Hellier & Ramsay 2006)

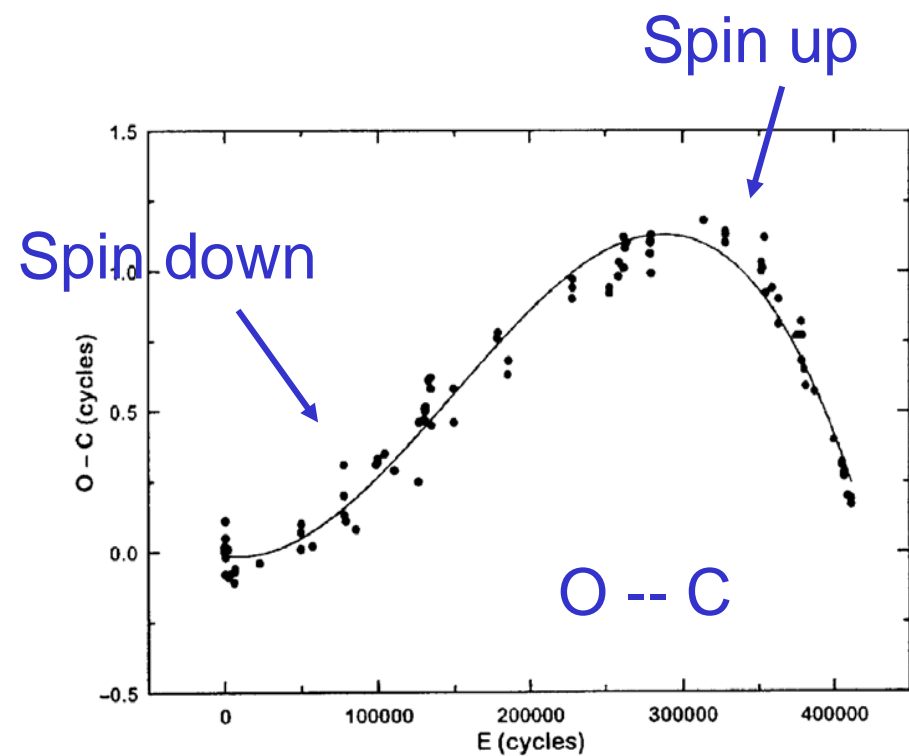


Complex spin pulse (X-ray, UV, IR, polarimetry, lines).



FO Aqr: accreting field lines  
**lag** magnetic pole &  
white dwarf is spinning **up**

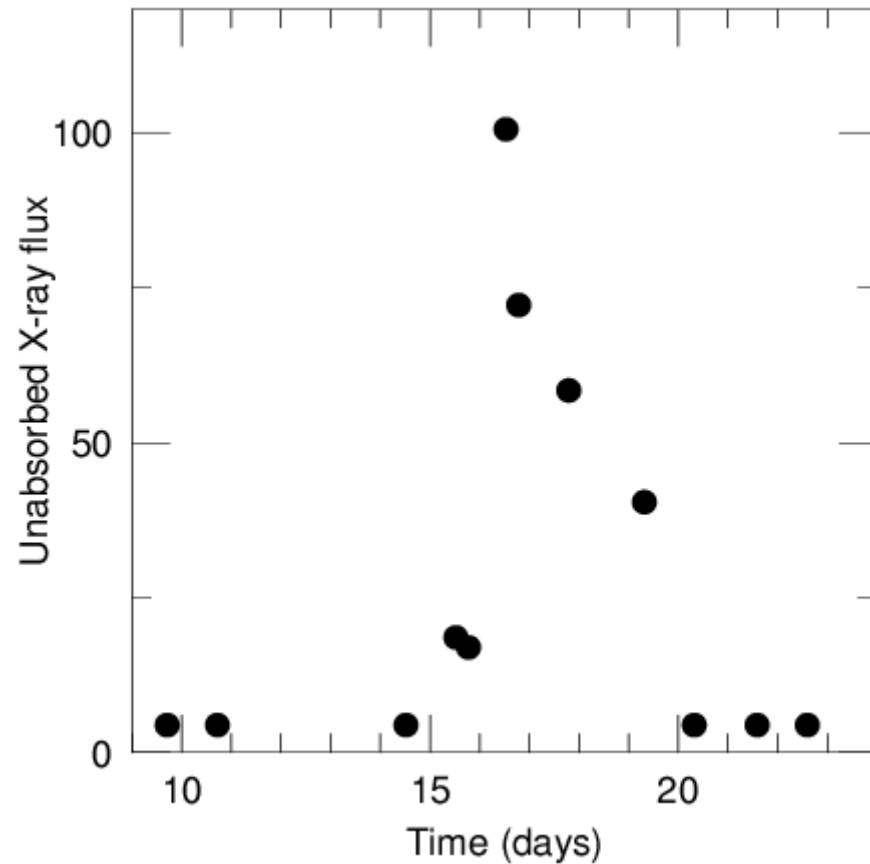
. . . but also down . . .



(Evans, Hellier, et al 2004)

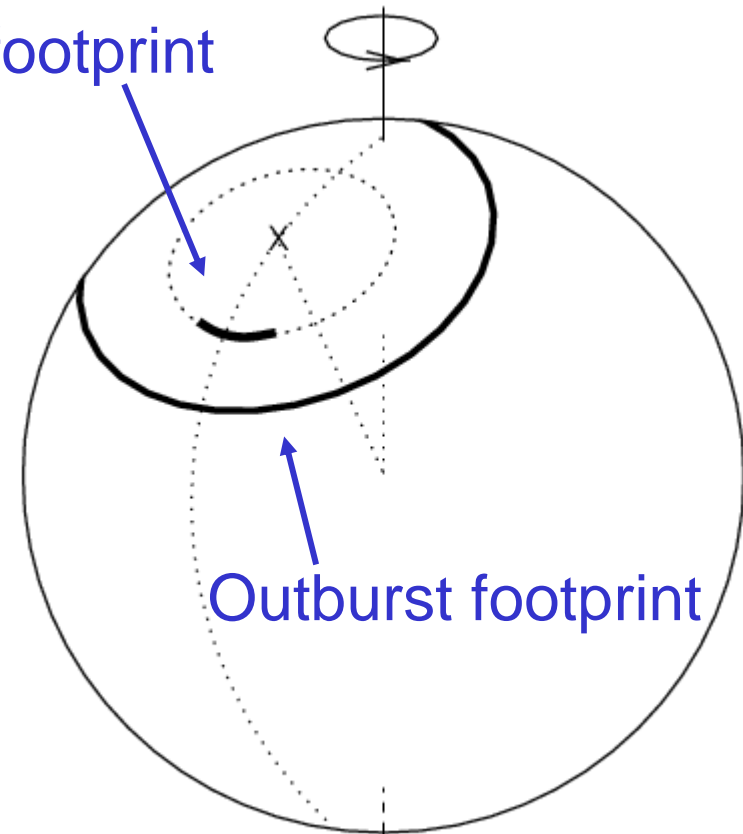


## XY Ari outburst



50-fold rise in accretion rate as disc pushes inwards; increases azimuthal range of accretion.

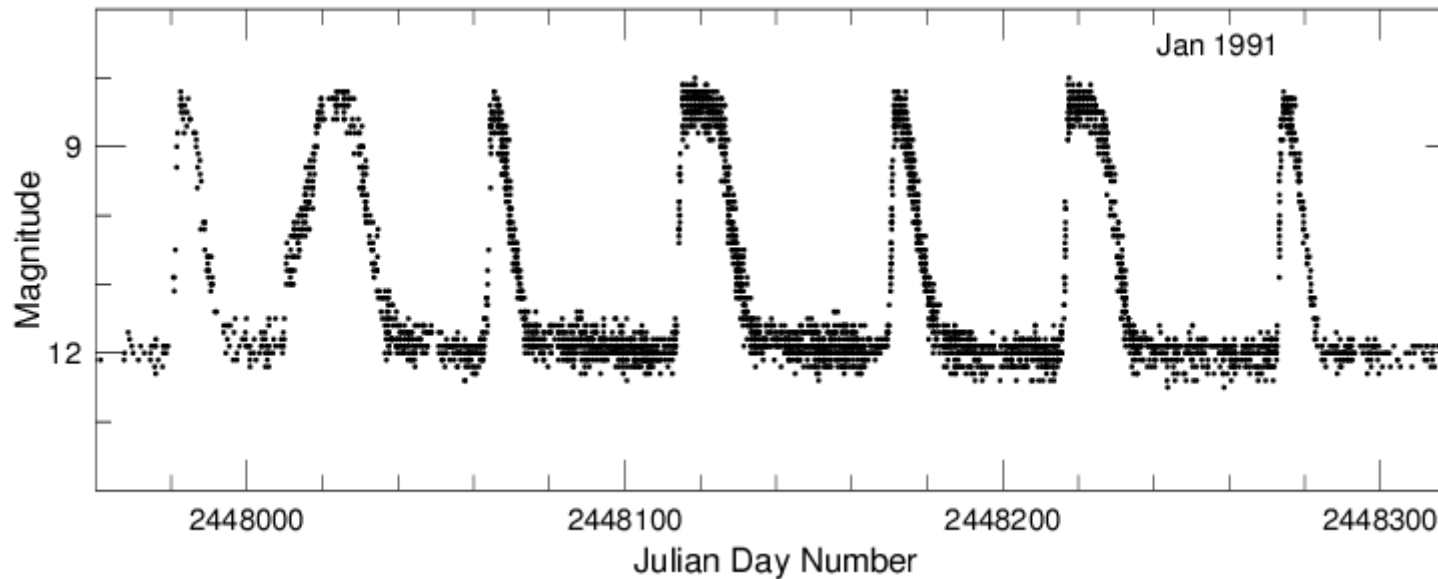
Quiescent footprint



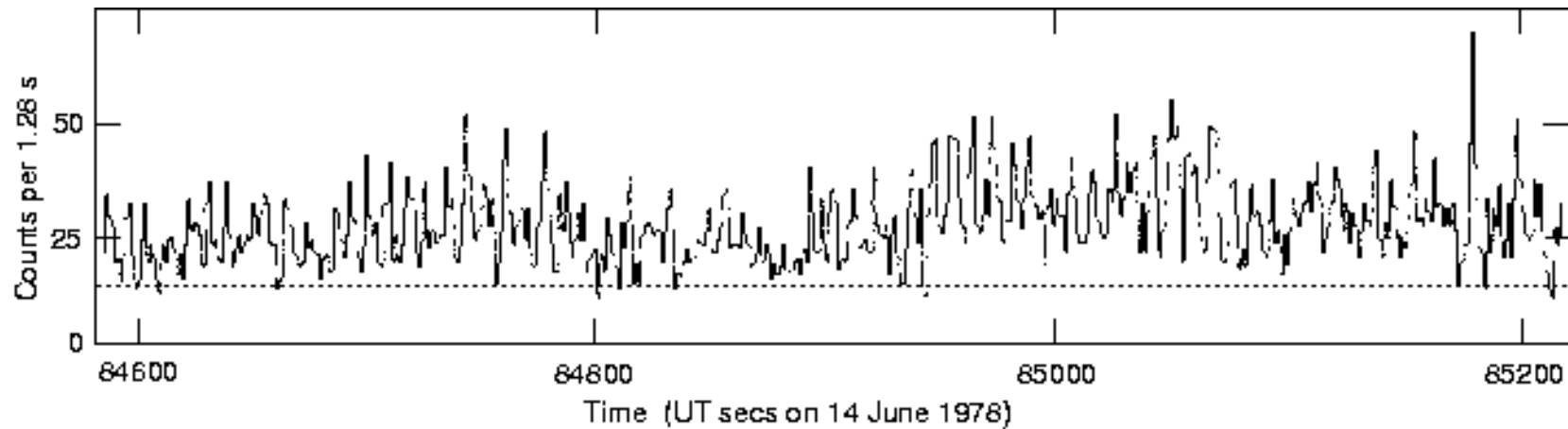
Footprints deduced from eclipses and spin-pulse profiles

(Hellier 2001)

## SS Cyg: disc-instability outbursts



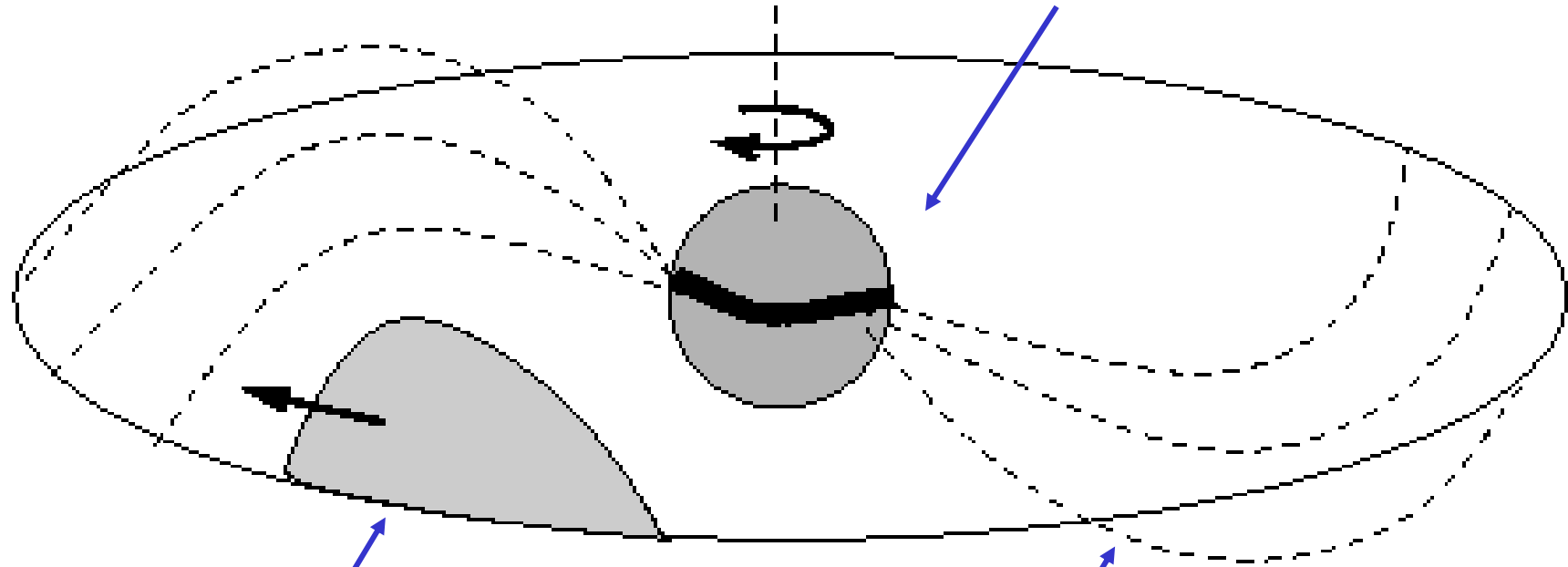
## 6-sec “Dwarf Nova Oscillation”



DNOs seen only in outbursts --- so no field in quiescence?

# Warner & Woudt model for DNOs

Equatorial belt  
spun up by outburst



Excites slow-moving bulges  
(prograde travelling waves)

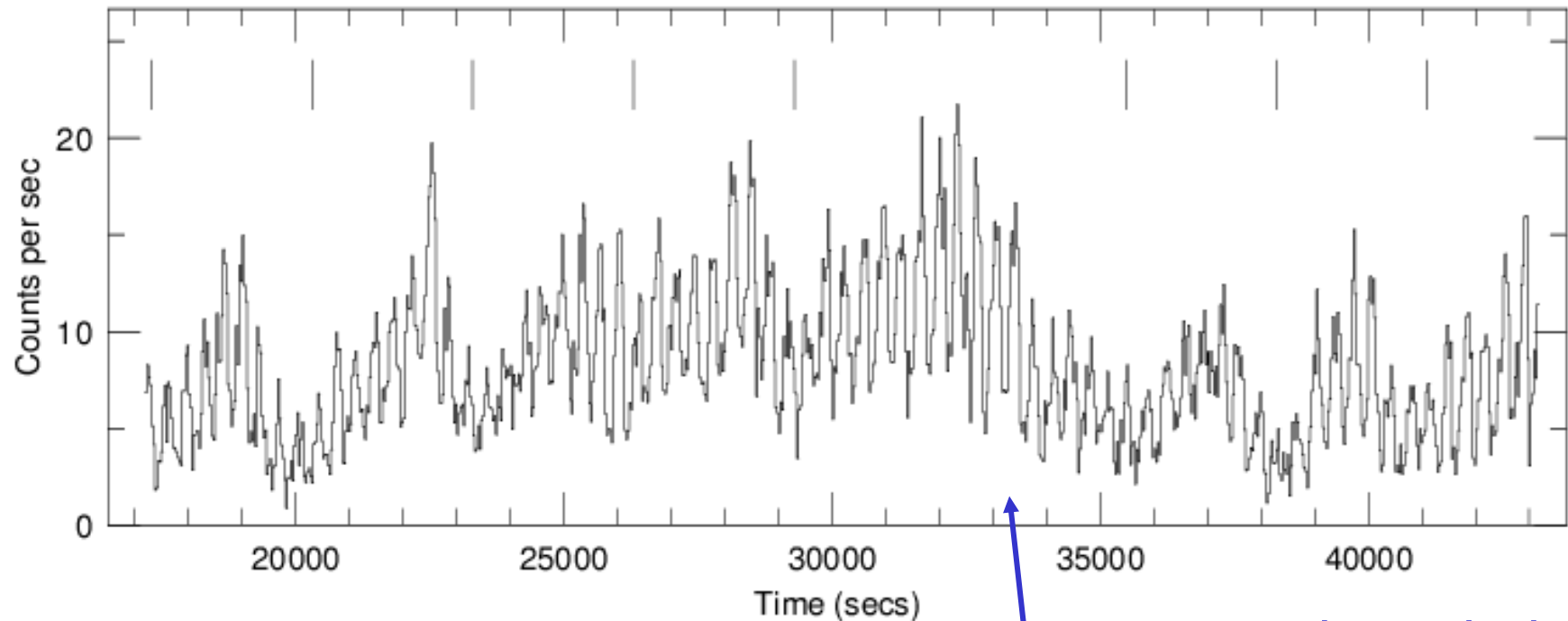
Causes absorption dips => "QPOs"  
Period of QPO = 15 X Period of DNO

Field generated by  
dynamo of belt spinning  
over white-dwarf body

Spin period => DNO

## GK Per in outburst (X-ray lightcurve)

5000-s quasi-periodic dips

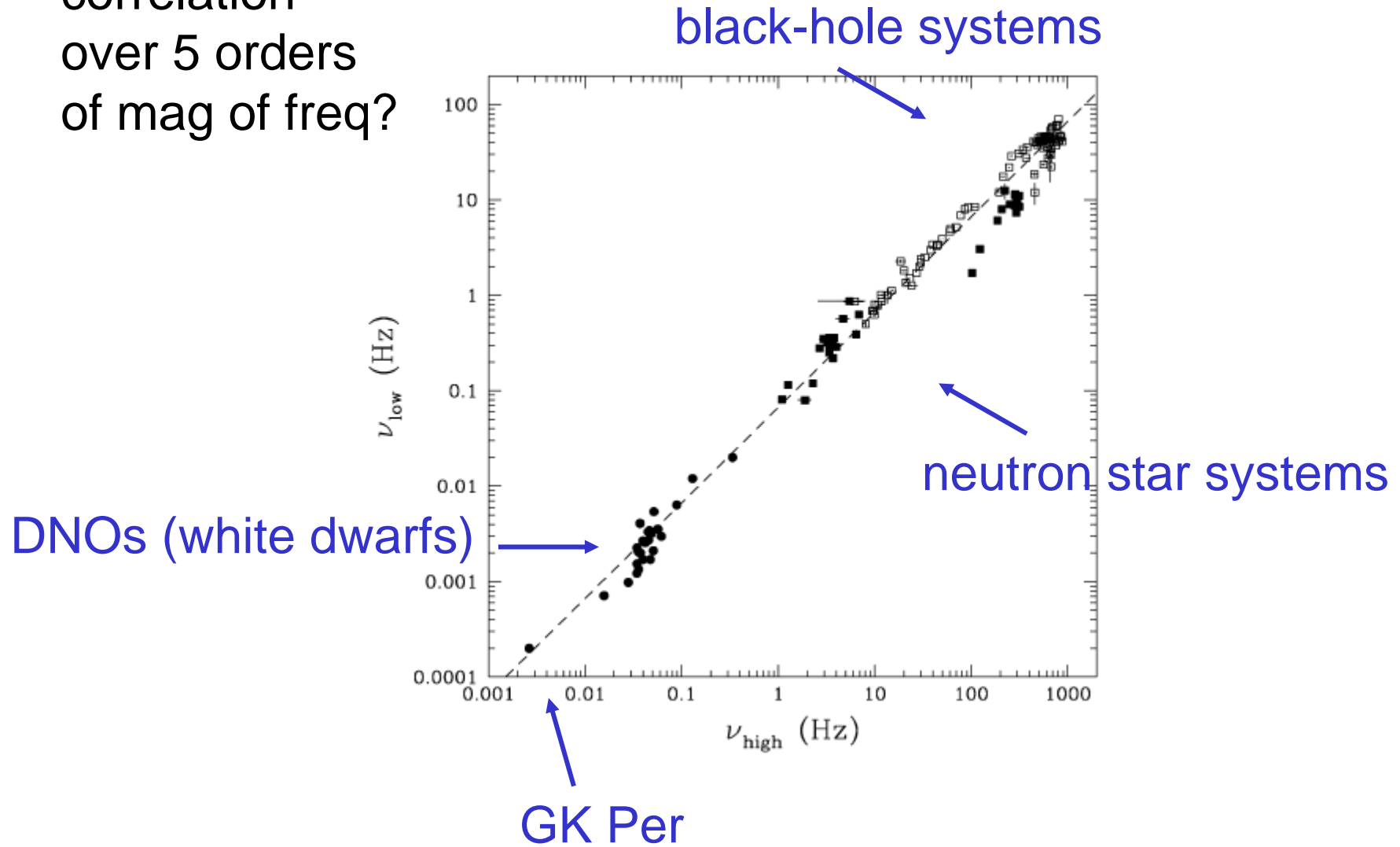


351-sec spin period

Bulges from prograde travelling waves  
excited at inner edge of disc?

--- only when disc/field not in equilibrium, e.g. outburst?

QPO v DNO  
correlation  
over 5 orders  
of mag of freq?



(Warner & Woudt 2004)

## Summary:

Accretion-flow/magnetic-field interactions in MCVs show:

Magnetically channelled funnel flows

Streams flipping between poles on “beat” cycle

Diamagnetic “blobs” crossing field lines, forming discs

Streams flowing over discs, interacting with field.

Disc--field torques causing spin-up and spin-down

Pattern of feeding onto field deduced from footprints

Disc--field torques distorting field lines

Disc--field feeding changing radically during outburst

Outbursts causing dynamo-generated magnetic fields

Excitation of waves/bulges at inner disc