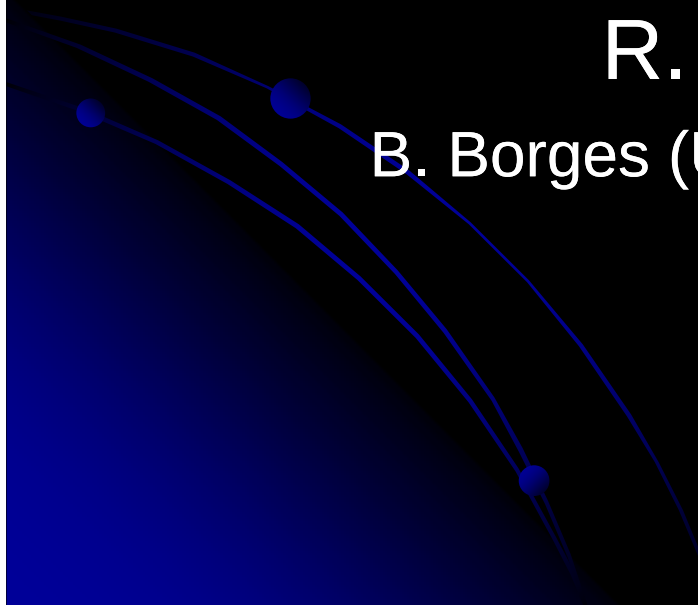


V4140 Sgr: a SOAR flickering mapping experiment

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Cataclysmic variables: basic model

- $L_{\text{acr}} = \frac{1}{2} G M_{\text{WD}} \dot{M}_{\text{dot}} / R_{\text{WD}}$

- $\nu = \alpha C_s H$

(Shakura & Sunyaev 1973)

- Nova-likes:

- > high α (0.1-1)

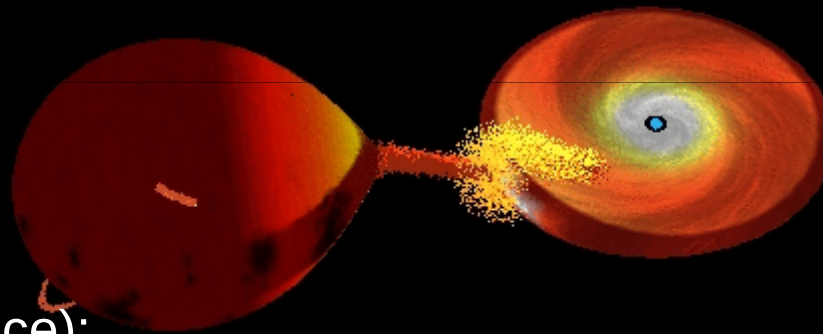
- > high $\dot{M}_{\text{dot}}$ ($10^{-9} - 10^{-8}$)

- Dwarf novae (quiescence):

- > low α (<0.05)

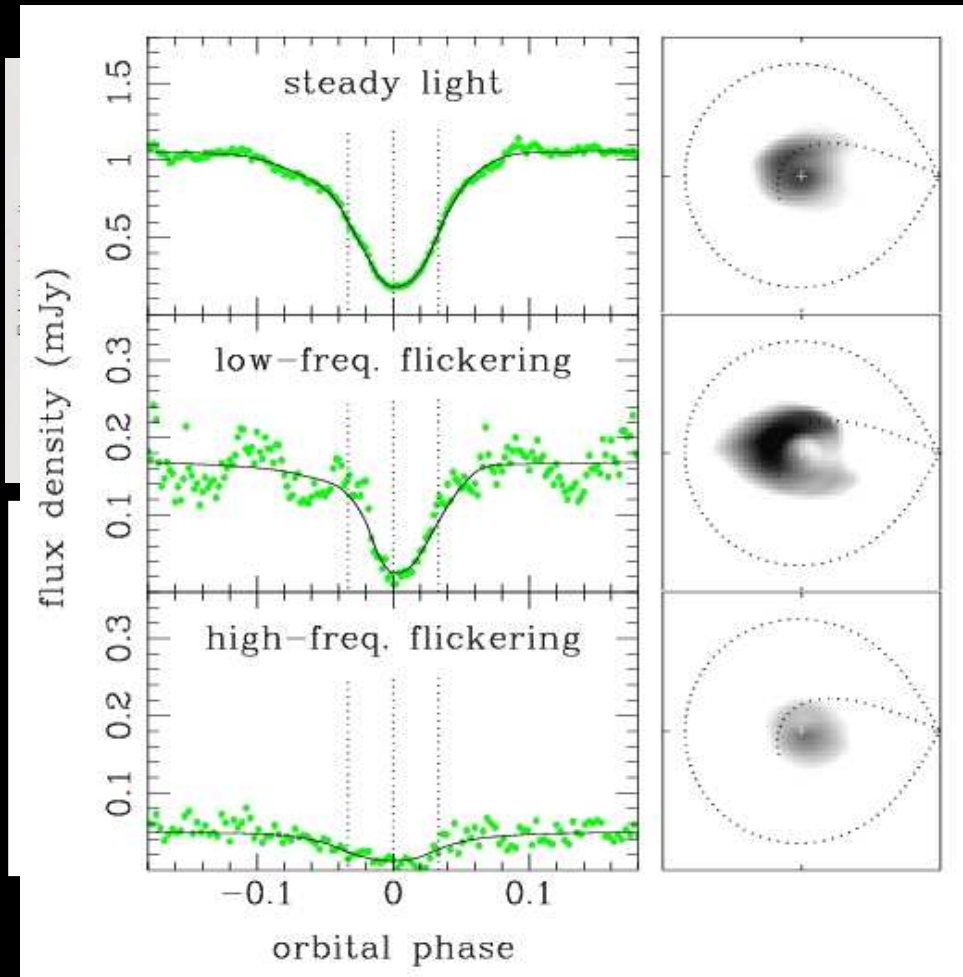
- and/or

- > low $\dot{M}_{\text{dot}}$ ($10^{-11} - 10^{-10}$)

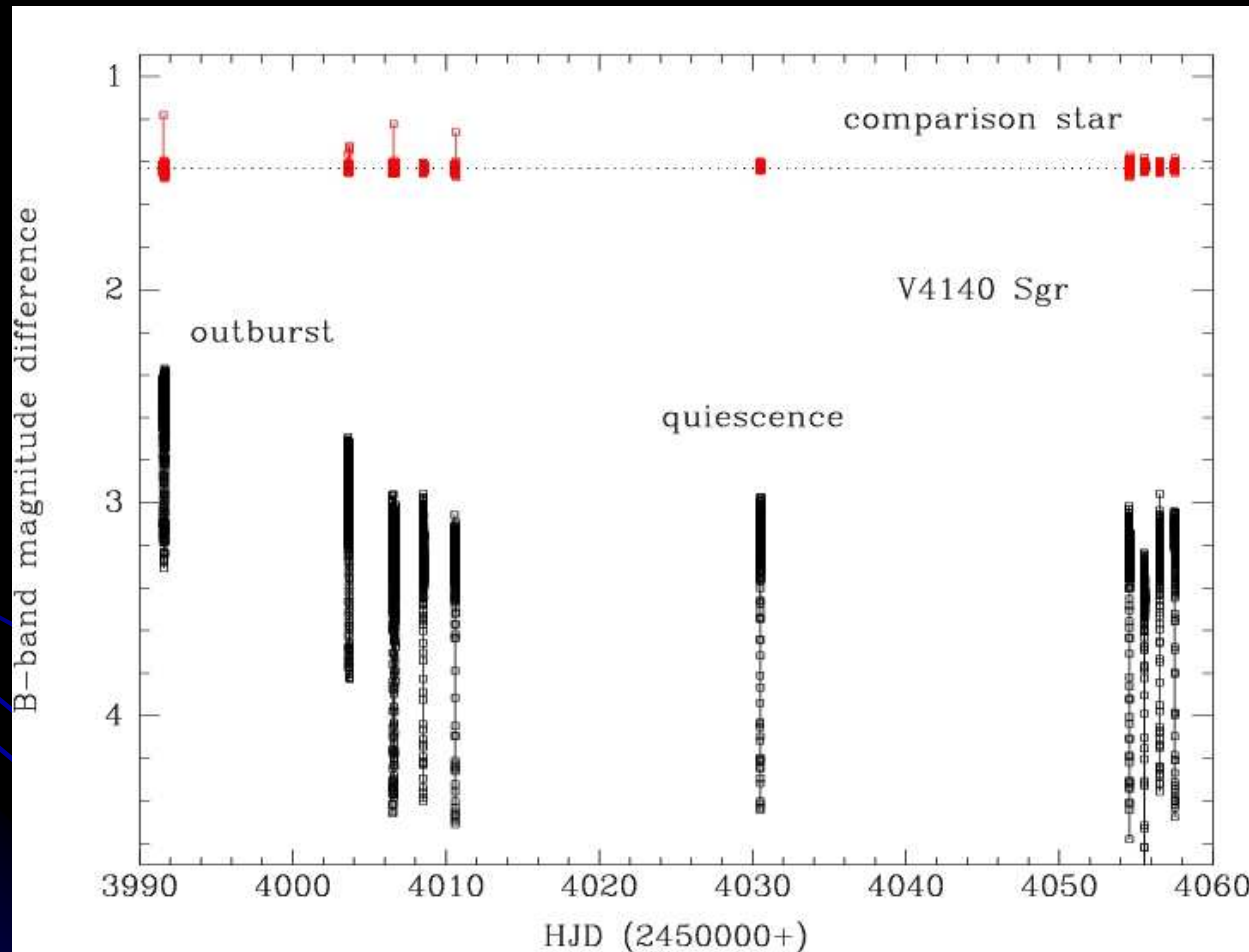


Fast variability in CVs: flickering

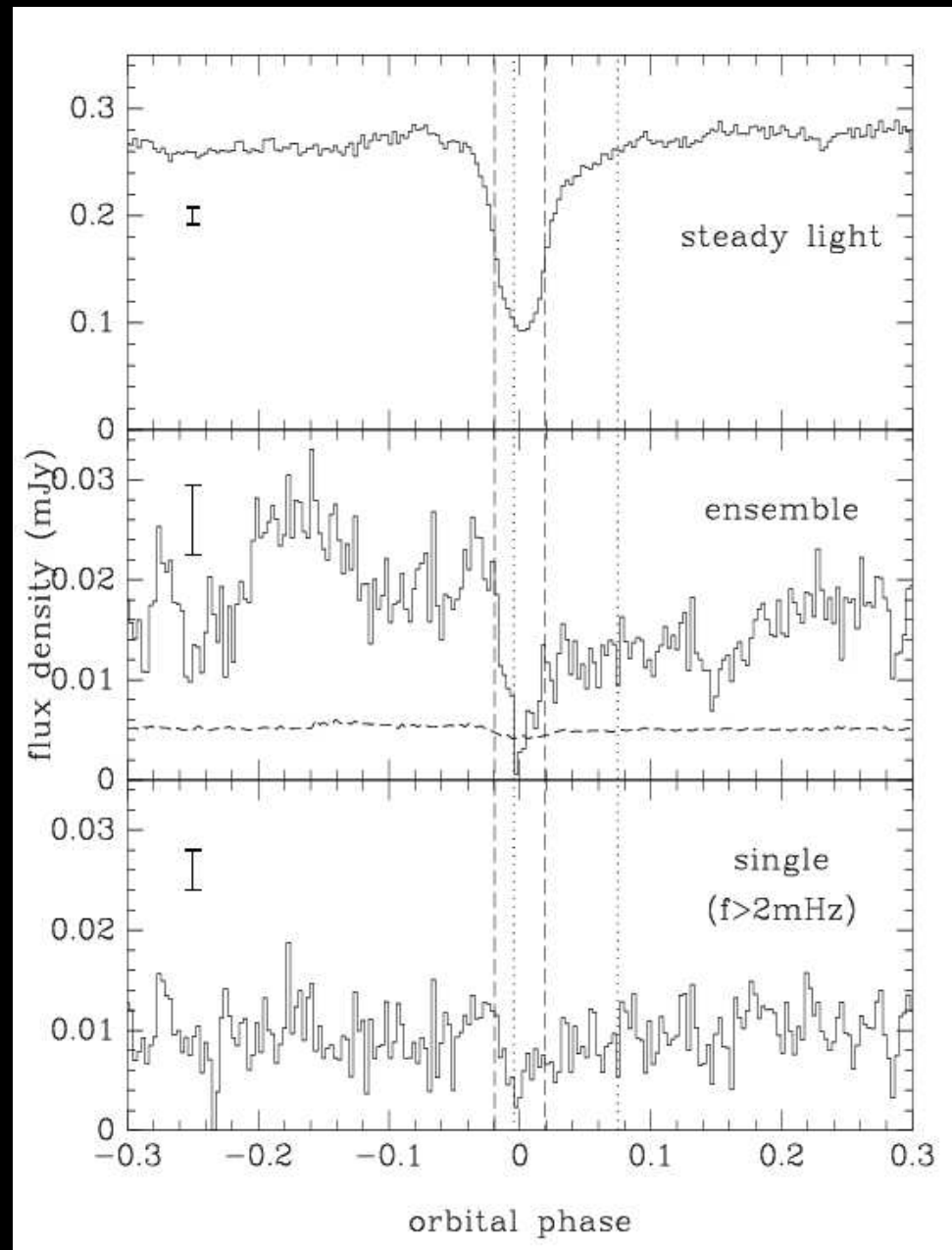
- BS + gas stream flickering
 - inhomogeneous $\dot{M}_{\text{dot}}$ (Warner & Nather 1971)
 - Turbulence at stream-disc impact (Shu 1976)
- Disc flickering
 - Convection & Turbulence (Gertseema & Achterberg 1992)
 - Magnetic reconnection (Kawagushi et al 2000)



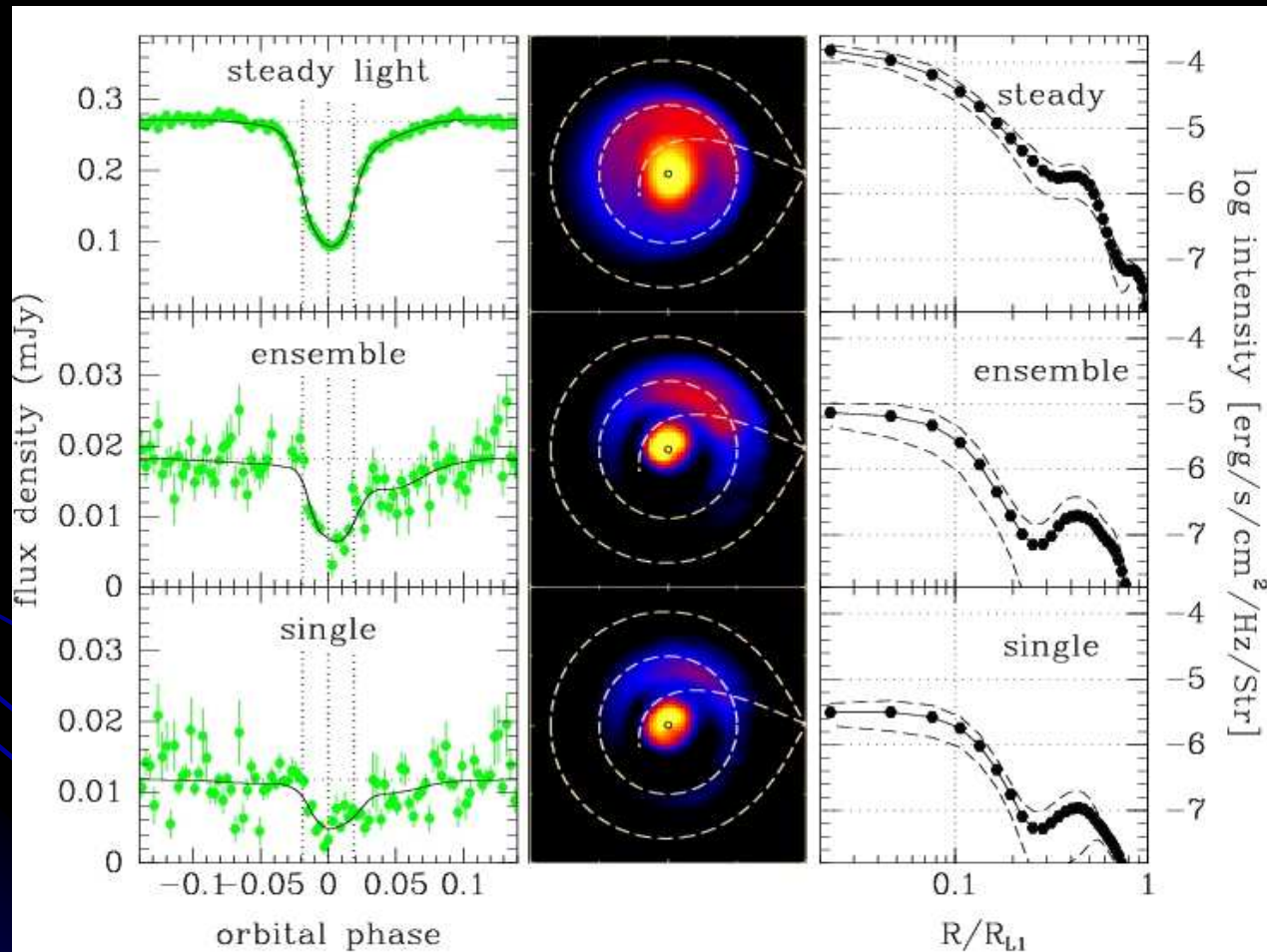
V4140 Sgr: the SOI/SOAR data



- 15 quiescent light curves w/ eclipses
- Scatter $\rightarrow$ flickering
- Asymmetric eclipse of flickering with orbital hump
- Analysis: ensemble & single methods

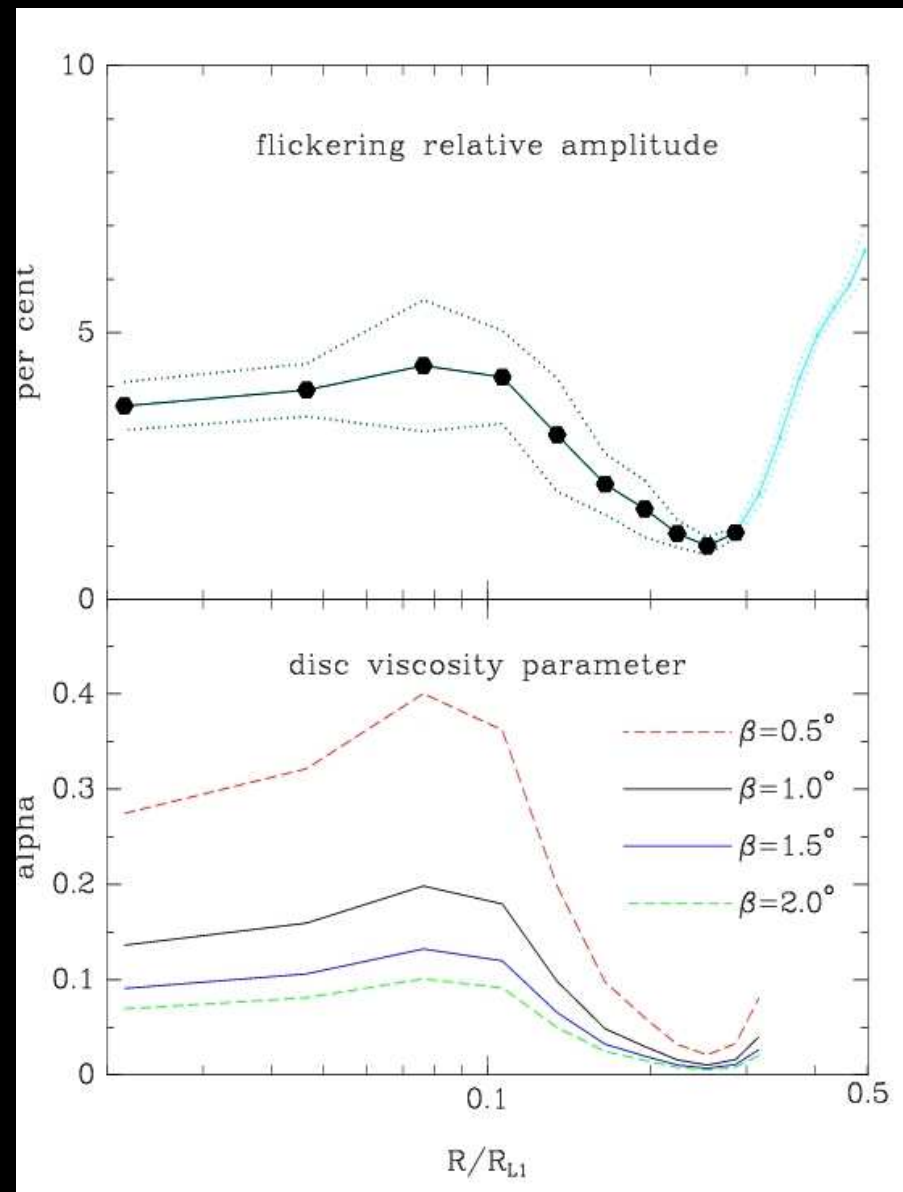


Steady-light & flickering maps

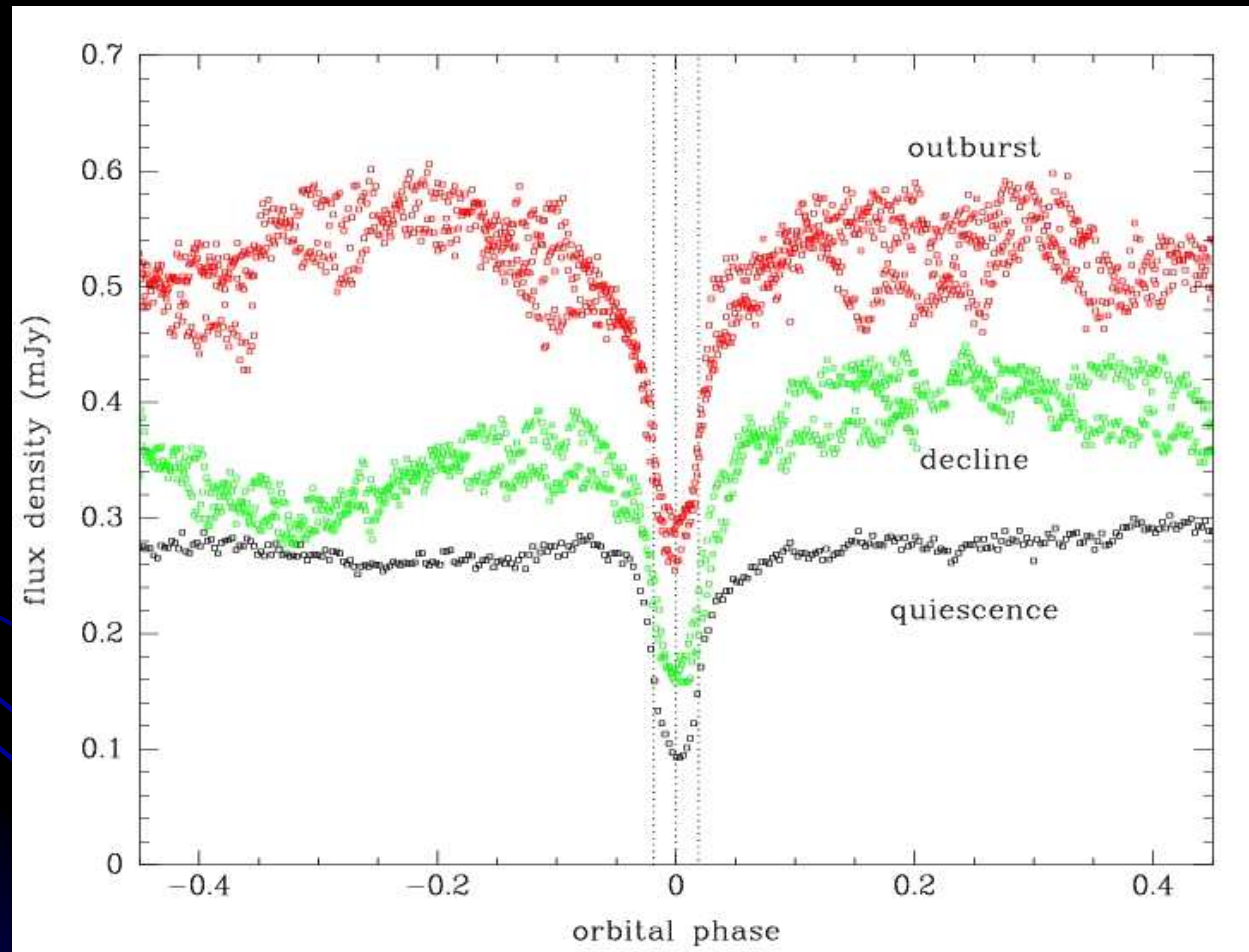


Flickering amplitude & disc viscosity

- MHD turbulence
(Gertseema & Achterberg 92)
 $\alpha \sim 180 (\sigma_D/D)^2 (0.01 \text{ r/H})$
- High viscosity disc:
 $\alpha \sim 0.1$ if $\beta < 2.0^\circ$
- α decreases with increasing radius

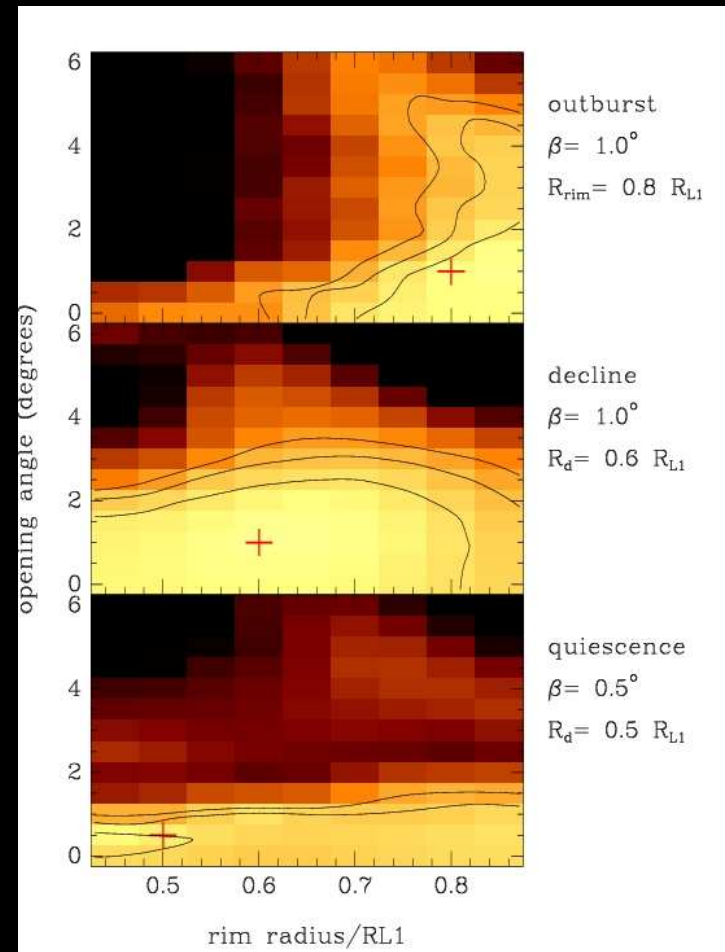


The 2006 September outburst

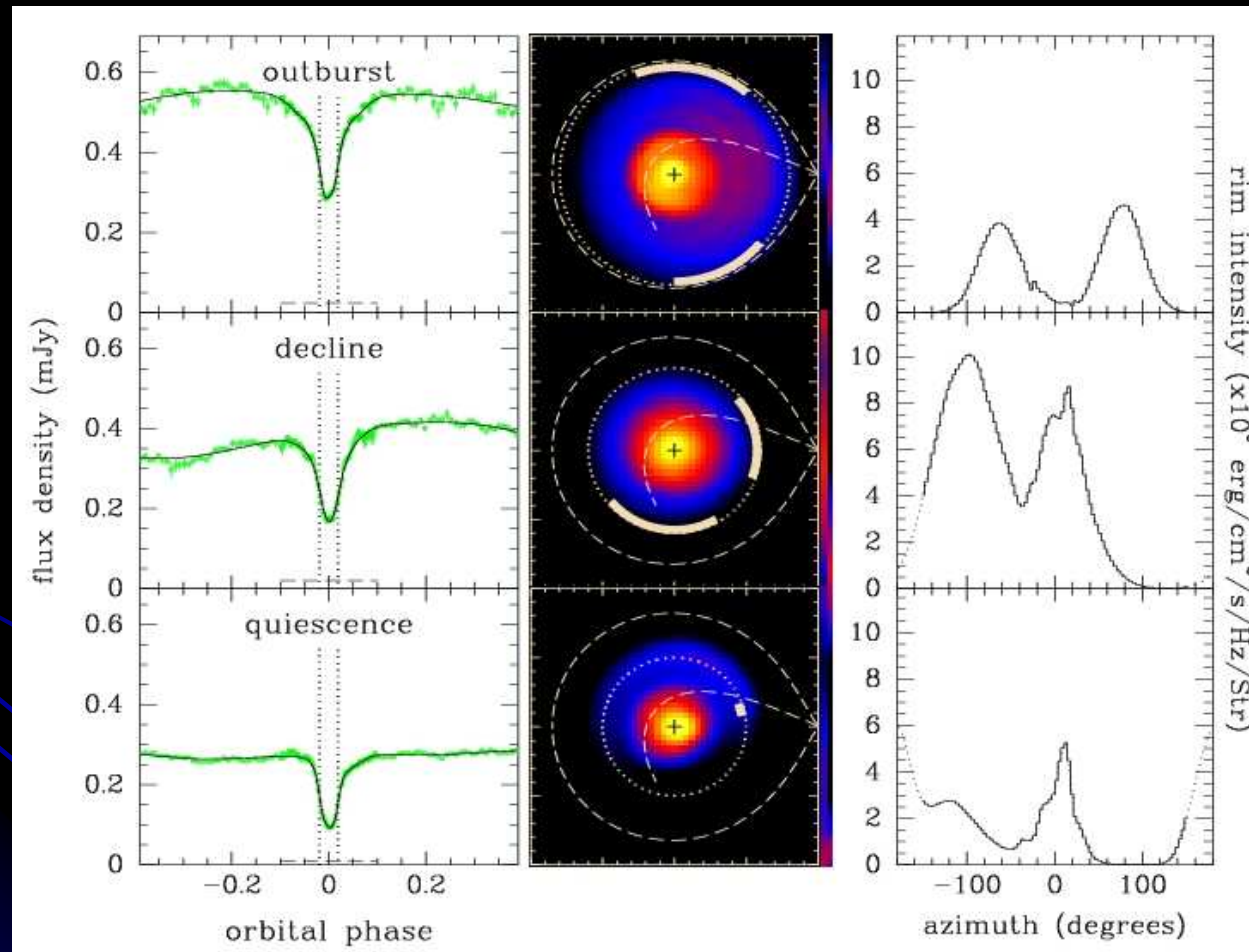


Disc geometry from entropy landscape

- 3D eclipse mapping: β (opening angle) + R_d (rim)
- Geometrically thin disc (even in outburst):
 $\alpha_{\text{out}} < 2.0^\circ$
(supports high viscosity)
- Disc shrinks during decline:
 $R_d(\text{out}) = 0.8 R_{L1}$
 $R_d(\text{quies}) = 0.5 R_{L1}$



Disc brightness maps from outburst to quiescence



Conclusions

- Evidences that V4140 Sgr is another dwarf nova with a highly viscous quiescent disc
 - Inconsistent with disc instability model
 - Outbursts probably powered by bursts of enhanced mass transfer from donor star
 - Members of this group: EX Dra, HT Cas, V2051 Oph, V4140 Sgr, ... (hunting others)
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