

## The Curious Case of V CVn (MSc Seminar)

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**TIME:** 3:00 PM

**PLACE:** C2045

**ABSTRACT:** Observationally, the star V Canum Venaticorum (V CVn) has strange behaviour regarding the maxima and minima of its light curve and polarization, which have a roughly inverse relationship (sometimes with a lead/lag time between them) and an almost constant polarization position angle over many decades. One theory proposed to explain this strange behaviour is the existence of a bow shock driven by a dusty wind from the star, which varies with time due to radial pulsations. This work uses a new framework developed in Zeus3D, a multi-physics magnetohydrodynamics code, to test this theory. Simulation results show that when a time-varying stellar wind is at its maximum brightness, a dense, symmetric shell forms around the star, causing the polarization signal to be dominated by symmetry, forcing it to a minimum. Conversely, when the brightness is at a minimum, the symmetric shell around the star is much less dense, and the polarization is instead dominated by the asymmetric bow shock structure, causing the polarization signal to attain a maximum value. Numerically reproducing the observed inverse relationship between the polarization and light curve provides a strong theoretical argument that a variable stellar wind bow shock is the solution to the curious case of V CVn.

**ALL ARE WELCOME!**