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Evidence for AL Comae Berenices being a Magnetic Cataclysmic Variable

AL Com was originally suspected of being a supernova based on its large outburst amplitude; being near 9 magnitudes. Recently, it has been shown (see refs below) to be a cataclysmic variable (CV), and a likely candidate member of one of the magnetic subclasses.

During April 1987 (Howell and Szkody 1988) the light curve of AL Com showed nearly equal 0.4 mag peak-to-peak modulations with a clearly defined period of 40 ± 1 min. Two years later (Szkody and Howell 1989), the star was observed again at higher time resolution. Period analysis of these data revealed a similar period of 42 ± 1 min, but also showed strong harmonics at 21 and 10.5 minutes. Mukai *et al.* (1990) obtained spectroscopy of AL Com which showed strong Balmer emission lines, thus ruling out the possibility of AL Com being a double degenerate with a short orbital period. It was suggested, based on these results, that AL Com was a likely member of the DQ Her subclass of CVs, with the ~ 40 min period having a likely origin as the spin period of the white dwarf.

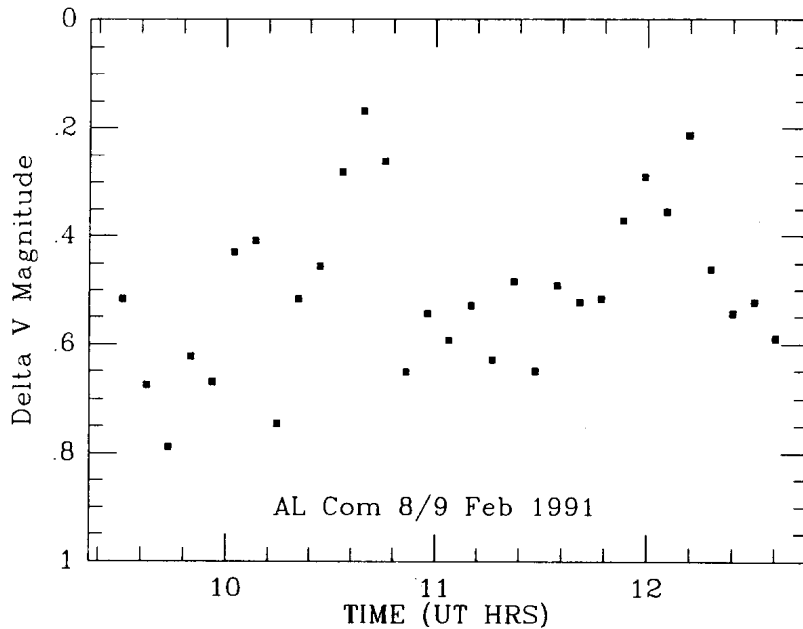
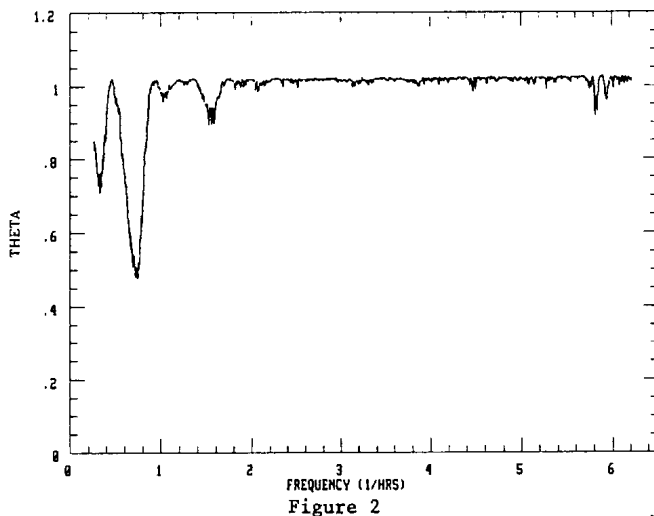


Figure 1



New data obtained by us in Feb. 1991 (when AL Com was 0.6 mags brighter in V than our previous data), showed a different light curve. The 0.4 mag modulation was present but at a period of 84 min, which is exactly twice that previously seen. The power spectrum shows only this single strong period, with only a very weak indication of any period near 40 min and no other harmonics. Since the spin period usually dominates in the optical, we cannot reconcile these observations with a DQ Her type system (i.e., $P_{\text{orb}}^{-1} = P_{\text{spin}}^{-1} - P_{\text{beat}}^{-1}$), unless AL Com sometimes shows a beat period of 42 min that dominates over a spin period of 28 min for the white dwarf.

We believe a better interpretation is that AL Com has switched from two previous active accretion areas to one current active area; behavior often seen in AM Her stars. These types of binaries have strongly magnetic white dwarfs which are in synchronous rotation with the secondary and show episodes during which one or both of the accretion poles are active. X-ray observations are needed to completely confirm our hypothesis.

We feel that the progression of the light curve over the past 5 years and the appearance of a single strong period at 84 minutes, twice that previously seen, provides strong evidence for a magnetic nature for AL Com.

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