

Magnetic field and unstable accretion during the AM Herculis low states

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Abstract. A study of AM Her low states in September 1990 and 1991 and June-July 1997 is reported from a coordinated campaign with observations obtained at the Haute-Provence observatory, at the 6 m telescope of the Special Astrophysical Observatory and at the 2.6 m and 1.25 m telescopes of the Crimean observatory. The spectra obtained at different dates when the source was in low states at a comparable V magnitude showed the presence of strong Zeeman absorption features and marked changes in emission lines with a day-to-day reappearance of the HeII (4686 Å) emission lines in 1991. Despite this variability, the magnetic field inferred from the fitting of the absorption spectrum with Zeeman hydrogen splitting is remarkably constant with the best value of (12.5 ± 0.5) MG. A detailed analysis of the UBVRI light curves shows the presence of repetitive moderate amplitude (≈ 0.3 - 0.5 mag) flares predominantly red in colour. These flares are attributed to small accretion events and are compared to the large (≈ 2 mag) blue flare reported by Shakhovskoy et al. (1993). We suggest that the general flaring activity observed during the low states is generated by accretion events. The different characteristics of the flares (colour and polarization) are the results of different shock geometries depending on the net mass accretion flux.