FAST-TIME SPECTROSCOPY AND PHOTOMETRY OF THE AM HER–TYPE SYSTEM AN UMA (MARCH 1991 AND JANUARY 1992)

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ABSTRACT. AN UMa has been observed at the 6–meter telescope of the Special Astrophysical Observatory on 10–11 March 1991 and 28 January 1992. Spectroscopic and photometric data were obtained simultaneously. Spectra were acquired using a TV scanner (Drabek at al. 1986) with the spectrograph SP–124 in the wavelength range (3950–4950 Å) with the spectral resolution 2 Å. Photometric UBVR measurements and light curves in filter B were performed at NEF photometer (Vikulev et al. 1991) with a temporal resolution of 0.1 s. The behaviour with the orbital period of the hydrogen and helium emission lines profiles (Hβ, Hγ, He II 4686), equivalent widths, relative intensities, half–widths and velocities was investigated. The velocity of the peaks and the centers of gravity of emission lines were used for the velocity curves with the orbital period. Analysis of the velocity curves shows a significant phase shift (0.20 cycle) with respect to the ephemeris period of Liebert et al. (1982), due to the inaccuracy of the orbital/rotation period. From a re–analysis of all the published spectroscopic data for the narrow-line components, a new ephemeris for the 'blue–to–red gamma crossing time' was determined:

$$T(HJD) = 2443191.0255 \pm 24 + 0.07975282^{d} \pm 4 \cdot E$$

With this new period, we find that all the published photometric light curves are also correctly phased over more than 15 yr (Bonnet–Bidaud et al. 1992). High speed photometric data were used to search for temporal variations. The quasi–periodic oscillations (QPO), which are similar in frequency and amplitude to those reported by Middleditch (1982) and Larsson (1985, 1987, 1989), were detected in 102.4s segments of data. The amplitude of the QPO varies from 1.6 to 4% with a frequency width of 0.25 to 0.50 Hz (FWHM) around a centroid frequency which is only slightly variable from 0.6 to 0.72 Hz (1.4 to 1.7 s). No significant variation of amplitude with orbital phase was detected. On short intervals of time, the QPO pulsed fraction varies from 1 to 5% rather erratically. The observed QPO are most probably trains of low coherence oscillations (less than a few tens of cycles) rather than superposition of persistent low amplitude coherent pulsations with different frequencies.

Key words: Stars: Cataclysmic; Polars; AN UMa

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