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Photometric and spectral studies of the eclipsing polar CRTS CSS081231 J071126+440405

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Abstract

© 2016, Pleiades Publishing, Ltd. We present the results of the study of the eclipsing polar CRTS CSS081231 J071126+440405. Photometric observations allowed us to refine the orbital period of the system (Formula presented.). Considerable changes in the appearance of the object's spectra have occurred over the period of September 20–21, 2001: the slope of the continuum changed from “red” to “blue”, and the variability of the line profiles over the duration of the orbital period has also changed. Doppler maps have shown a shift of the emission line-forming region along the accretion stream closer to the white dwarf. We measured the duration of the eclipse of the system and imposed constraints on the inclination angle (Formula presented.). The derived radial velocity amplitude was used to obtain the basic parameters of the system: $M_1 = 0.86 \pm 0.08 M_{\odot}$, $M_2 = 0.18 \pm 0.02 M_{\odot}$, $q = 0.21 \pm 0.01$, $RL_2 = 0.20 \pm 0.03 R_{\odot}$, $A = 0.80 \pm 0.03 R_{\odot}$. The spectra of the object exhibit cyclotron harmonics. Their comparison with model spectra allowed us to determine the parameters of the accretion column: $B = 31\text{--}34 \text{ MG}$, $T_e = 10\text{--}12 \text{ keV}$, $\theta = 80\text{--}90^\circ$, and $\Lambda = 105$.

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Keywords

method: polarization, novae, cataclysmic variables