

The Stability of Superorbital Period of Low-mass X-ray Binary 4U1820-30

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4U 1820-30 is a ultra-compact low mass X-ray binary located near the center of globular cluster NGC 6624. In addition to its 685s orbital variation, it also exhibits a superorbital orbital modulation with a period of ~ 171 days. From the stability of this period, the superorbital modulation was considered being induced by a hierarchical third star orbiting around the binary system. To further confirm the stability of the period, we analyzed the light curves collected by Ginga, RXTE/ASM, RXTE/PCA, Swift, MAXI and Fermi. Combined with the result from Vela 5B observation, the superorbital period measured from the power spectra was found in fact decreasing from 176 days to 166 days. Phase analysis allows us to trace the superorbital period variation in more detail. The phase evolution revealed that the period may have experienced an abrupt change (glitch) from 170.78 ± 0.79 days to 167.46 ± 0.18 days around MJD 52502. On the other hand, the phase evolution was also well-fitted with a quadratic curve, indicating a period derivative of $\dot{P} = (-8.41 \pm 1.58) \times 10^{-4} \text{ s s}^{-1}$. Either of these results challenges the stability of superorbital period predicted by the triple model.

Section

High Energy

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