

**SUPERMASSIVE BINARY BLACK HOLE CANDIDATE
PG 1302-102: OSCILLATIONS AND PERTURBATIONS
IN THE PHOTOMETRIC LIGHT CURVE**

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PG 1302-102 shows periodic variability, which makes this object one of the most promising supermassive black hole binary candidates. Interestingly, a newly collected data shows an interesting pattern which was interpreted as a decrease in the significance of periodicity, which may suggest that the binary model is less favorable. We present detailed analysis of photometric PG 1302-102 light curve including 1) a supermassive black hole binary system model in which a perturbation in the accretion disk of a more massive component is present; 2) our 2DHybrid method for periodicity detection in the light curves.

Our model explains well observed light curve, using a slight perturbation of a sinusoidal feature, and predicts that a slightly larger period than previously reported, of about 1899 days, could appear due to a cold region in the disk of a more massive component of a close, unequal-mass ($q=0.1$) black hole binary system. According to our model, one could expect that light curve follows the pattern of a sinusoid-like shape within a few years, which could be observed by sky surveys. Using our 2DHybrid method for periodicity detection, we calculated that the periods in the observed (1972 ± 254 days) and modeled (1873 ± 250 days) light curves are within 1σ , which is also consistent with result from our physical model and with previous findings. Thus, the periodic nature and its slight fluctuation of the light curve of PG 1302-102 are explained by our physical model and confirmed by our 2DHybrid method for periodicity detection.

References

Kovačević, A., Popović, L. Č., Simić, S., Ilić, D.: 2019, *The Astrophysical Journal*, **871**, id.32, 11pp.