

Abstract Submitted
for the CUWIP22 Meeting of
The American Physical Society

The Evolution of the Orbital Period in the Black Hole Binary Star System GRO J1655-40 ANAVI UPPAL, CHARLES BAILYN, Yale University, GEORGIOS VASILOPOULOS, Yale University and Strasbourg Astronomical Observatory — Binary black hole systems consist of a star closely orbiting a black hole. The intense gravity of the black hole pulls material from the star into an accretion disk. When a particularly large amount of mass is pulled into the disk, the system goes into an outburst, and becomes very bright in x-ray wavelengths. This movement of mass is expected to cause a change in the orbital period of the system. It is believed that these systems could be the precursors for black hole mergers (observed by LIGO), and monitoring these orbital changes could give insight into how they evolve toward their eventual merger. We analyzed optical data spanning twenty years from the system GRO J1655-40. The pre-outburst period of this system was 2.62191 ± 0.00020 days. Using phase dispersion minimization, we calculated the post-outburst period of the system to be 2.621925 ± 0.000014 days. Due to the relatively large error on the pre-outburst period, we currently have only upper limits on any period change. However, additional pre-outburst data is available, and there is significant infrared data from throughout the time span that has not yet been incorporated into our measurement. We hope to refine these values further to measure, or put more significant limits on, the possible period change.

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Date submitted: 11 Jan 2022

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