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Determining the Relativistic Spin of the Black Hole Cygnus X-1
SEBASTIAN GOMEZ, The University of Texas at El Paso, MICHAEL NOWAK, Massachusetts Institute of Technology — Cygnus X-1 is a very well studied black hole in a high mass X-ray binary system. In order to have a complete description of a black hole one needs to know its mass and spin. The mass and spin of Cygnus X-1 have been measured to be $\sim$14.8 M$\odot$ and a* $>$ 0.95, respectively. The problem is that there is a dust cloud in the line of sight to Cygnus X-1. This dust cloud scatters the X-rays from the source creating a dust halo around the source. This could affect the previous measurements of black hole spin. We improved upon previous studies of the spin by modeling the dust halo that lies in front of the system with the use of the ISIS and MARX software analysis packages. We analyzed 2011 data from the Chandra and RXTE telescopes from when the system was in the high/soft, accretion disk dominated, state. The data fits well with a multi-temperature blackbody, a broken power law and a beta source function that was used to describe the dust halo. All of our fits yielded similar results, with spin values of a* $>$ 0.9. Accurately knowing the spin of Cygnus X-1 could give us insight into jet formation around black holes and when and how this black hole was formed.

Sebastian Gomez
The University of Texas at El Paso

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