Physical Parameter Estimation in Black Hole X-Ray Binaries

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We describe a recently developed method for extracting physical information on black-hole X-ray binary systems from their X- and gamma-ray spectral properties. The high-energy continuum is interpreted as thermal emission from an accretion disk and Comptonized emission from a relativistic bulk inflow. From the absolute normalization and an empirical determination of the hardening factor – the ratio of color-to-effective temperature – we can with minimal model dependency, use observables to determine parameters of the system such as the mass-to-distance ratio, and if the distance can be independently determined, the mass accretion rate, and the disk effective radius. Application of this methodology to recent X- and gamma- ray observations are presented, with emphasis on the recently discovered X-ray nova XTE J1550-564. This object has been observed with the Compton Gamma Ray Observatory, including pointed observations with OSSE at several epochs, and documentation of its high- energy flux history by BATSE. These data are combined with soft-X-ray data from the Rossi X-Ray Timing Explorer for our analysis. Information from dynamical studies of the quiescent binary system (by other groups) is beginning to emerge, and we will compare and our results with any results available from those studies.