X-RAY ASTRONOMY *2019*

Current Challenges and New Frontiers in the Next Decade

8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: **80**   Type: **Poster**

RELTRANS: A public model for X-ray reverberation mapping of accreting black holes

Friday, 13 September 2019 17:46 (2 minutes)

I will present the publicly available XSPEC model RELTRANS. The model calculates the light-crossing delays and energy shifts experienced by X-ray photons originally emitted close to the black hole when they reflect from the accretion disk and are scattered into our line-of-sight, accounting for all general relativistic effects. The model is fast and flexible enough to be simultaneously fit to the observed energy-dependent cross-spectrum for a large range of Fourier frequencies, as well as to the time-averaged spectrum. This not only enables better geometric constraints than only modelling the relativistically broadened reflection features in the time-averaged spectrum, but additionally enables constraints on the mass of supermassive black holes in active galactic nuclei and stellar-mass black holes in X-ray binaries. The model includes a self-consistently calculated radial ionization profile in the disk. I will show that the inclusion of this profile makes a significant difference to the parameters inferred from data through the example of a NuSTAR observation of the X-ray binary GRS 1915+105. I will also present model fits to the lag-energy spectrum of the Seyfert galaxy Mrk 335 that result in a best fitting black hole mass that is smaller than previous optical reverberation measurements (~7 million compared with ~14-26 million solar masses). I will discuss how in future X-ray and optical reverberation analyses can be combined to constrain the geometry of the X-ray emitting corona and the broad line region.

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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Session Classification: POSTER SESSION