



Physical Research Laboratory, Ahmedabad

Astronomy & Astrophysics Division

Seminar

Title : X-ray Relativistic Reflection & Testing Strong Gravity

Speaker : Dr. Kishalay Choudhury (IUCAA Pune)

Date : 12.12.2019 (Thursday)

Time : 16:00 Hrs

Venue : Seminar Room # 113/114 (Thaltej Campus)

Abstract

The first part of the talk presents results on the first, well-structured systematic study on the most up-to-date relativistic X-ray reflection code `relxill` for the dimensionless spin (a^*) parameter of astrophysical black holes, with spectral analysis of high-quality simulated data, emphasizing on only unabsorbed relativistic smearing and the detector resolution with NuSTAR. Yields even at high signal and low background seem to be subjective to fitting biases and the treatment of data, when checked against a similar work from literature. Nevertheless, $a^* > 0.8$ seems to be best recovered under the averaged conditions. The second part jumps into utilizing the knowledge gained from the first half, testing Einstein's strong gravity for the Kerr hypothesis in 4-dimensional spacetime around the supermassive black hole of the narrow-line Seyfert 1 galaxy Mrk 335 using the only available, high-signal Suzaku data for a low-reflection estimate with the initial release of the now-publicly-available non-Kerr extension to `relxill` (`relxillnk`), developed at the astrophysics group in Fudan University. Results tend to show weak constraints for a^* against two of the leading-order deformation parameters α_{13} and α_{22} of the Johannsen metric, recovering the Kerr metric at 1σ , and carry no weight or physical validity on solutions deviating from the Kerr geometry. This has been confirmed with a later, more sophisticated MCMC error analysis of the data with more up-to-date code and grids to examine the persistence of spurious solutions. A hybrid model, however, has been proposed for the first time for a high-flux state in this AGN, even with fits using the Kerr base model.

Tea/Coffee at 15:30 hrs.

All are welcome