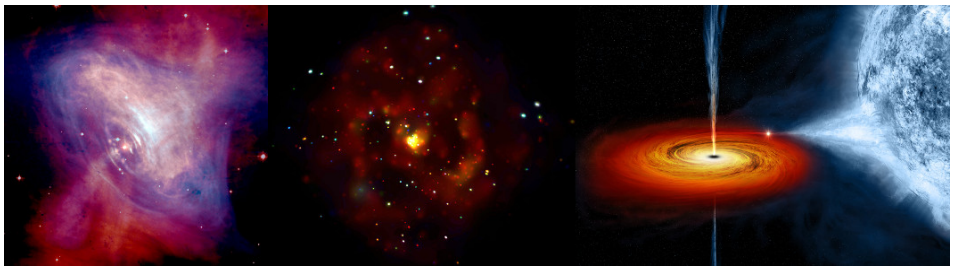

Contribution ID: **46** Type: **not specified**

Detection of possibly the heaviest black hole in Galactic X-ray binaries

Monday, April 3, 2023 2:45 PM (15 minutes)

Masses of most black holes discovered in X-ray binaries lie within a narrow range of 5 - 20 $M_{\odot}$. The formation of these black holes is understood using scenarios involving collapse of massive stars. Contrary to X-ray binaries, black holes discovered using gravitational waves from merger events have masses going up to 200 $M_{\odot}$. This apparent dichotomy had given rise to a belief of different formation mechanisms for the two classes of black holes. In our recent study of an X-ray binary MAXI J1631-479, we find the black hole in the system to be highly massive, lying in the range of gravitational wave objects. We carried out a comprehensive spectral analysis of the source using data from NICER and NuSTAR observatories. After tracing the state evolution of disk physical parameters such as density, ionization and Fe abundance we constrained the black hole spin and disk inclination using reflection spectroscopy. With obtained estimates on spin and inclination we fitted the soft state NICER spectra with a relativistic disk model to infer black hole mass and distance. A Monte Carlo simulation using optical observations of the source was carried out to infer the distance. A very conservative lower limit on the distance was found to be 4.5 kpc which corresponds to a mass of 15 $M_{\odot}$. If true MAXI J1631-479 will be the heaviest Galactic stellar-mass black hole, consequently bridging the mass dichotomy and opening up merger scenarios for black holes hosted in X-ray binaries.

Presentation Type

Oral

Primary author: ROUT, Sandeep (Physical Research Laboratory)

Co-authors: Prof. VADAWALE, Santosh (Physical Research Laboratory, Ahmedabad); Dr GARCIA, Javier (California Institute of Technology); Dr CONNORS, Riley (California Institute of Technology)

Presenter: ROUT, Sandeep (Physical Research Laboratory)

Session Classification: Black Hole: Observations

Track Classification: Black Hole: Observations