

The puzzling low luminosity accretion in black hole X-ray binaries

Wednesday, 15 June 2022 14:40 (15 minutes)

It has been well known for a long time that a black hole X-ray binary stays in the hard state when the luminosity is low (below around one percent of LEdd). The X-ray spectrum is dominated by the inverse Compton emission from a hot corona, which is very different from the thermal dominated spectrum from Shakura-Sunyaev disk at higher luminosity. In recent years, however, some observational results challenge the current understanding of low luminosity accretion. One is that the transition between the hard (Compton dominated) and soft (thermal dominated) state is discovered in the mini-outbursts of some black hole X-ray binaries with the luminosity range 10^{-5} - 10^{-3} LEdd and even lower, which detected above 1% LEdd before. The other one is that the electron temperature of the hot corona is positively correlated with the X-ray luminosity at the low luminosity regime, which contradicts with the expectation of current models. Therefore, our recent observational results make the low luminosity accretion still puzzling.

Topic

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Session Classification: Session III