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Probing radiation pressure instabilities in neutron star X-ray binaries using GLADIS

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Accretion disks around compact objects, such as black holes (BHs) or neutron stars (NSs), exhibit various types of spectral variability. These include long-term variabilities driven by thermoviscous instabilities in the accretion disks of low-mass X-ray binaries (LMXBs) and short-term variabilities, which are often attributed to thermal instabilities caused by radiation pressure from the central compact object. Transient neutron star X-ray binary sources, such as Swift J1858.6-0814, have demonstrated short-term variabilities. Our objective is to investigate these short-term variabilities in X-ray sources using the GLADIS code.
The Global Accretion Disk Instability Simulation (GLADIS) code, originally developed by the CTP Astro group for BH X-ray binaries and later adapted for Active Galactic Nuclei (AGN) sources, serves as an excellent tool for studying the time evolution of accretion disks through global 1D + 1D simulations. We extend this code to study NS X-ray sources, specifically incorporating the effects of the NS boundary layer and its irradiation. In this presentation, I will provide a summary of my experience with the GLADIS code and discuss the results of our efforts to integrate the NS boundary layer into the simulations.

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