Contribution ID: **8** Type: **Contributed talk in mini symposium**

Accretion onto black holes with saturated magnetic pressure: from numerical simulations to an analytical model

Thursday, December 14, 2023 4:27 PM (12 minutes)

Using radiation magnetohydrodynamical simulations of accretion onto stellar mass black holes, we revealed that the magnetic pressure, which can be approximated as due to saturated magnetic fields, is the dominant pressure component that supports the vertical structure of the disk. Also, strong disk winds present especially when the mass accretion rate approaches the critical rate. Based on these, we constructed an analytical model that incorporates both outflows and magnetic pressure. We find that, at high accretion rates, the disk is geometrically and optically thick, resembling the slim disk solution; at low accretion rates, the accretion flow consists of a geometrically thin and optically thick outer disk (similar to the standard disk) and a geometrically thick and optically thin inner disk (similar to the ADAF solution). Thus, with the magnetic pressure and outflow, the standard disk truncates and transitions into a hot accretion flow at small radii.

Primary author: HUANG, Jiahui (Tsinghua University)

Co-authors: FENG, Hua (Tsinghua University); Prof. GU, Wei-Min (Xiamen University); Dr JIANG, Yan-Fei (Flatiron Institute)

Presenter: HUANG, Jiahui (Tsinghua University)

Session Classification: Accretion Processes