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Super-Eddington accretion onto neutron stars and black holes

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Abstract content

Ultra-luminous X-ray sources (ULXs) are extragalactic, off-nucleus, point-like X-ray sources with enormous luminosity $> 10^{39}$ [erg s^{-1}], which exceeds the Eddington limit for stellar-mass black holes. Because of such a large luminosity, ULXs are expected to be powered by the super-Eddington accretion onto neutron stars or stellar-mass black holes, or sub-Eddington accretion onto intermediate-mass black holes. Recent discoveries of X-ray pulses in some ULXs have confirmed that the super-Eddington accretion onto neutron stars occurs in some ULXs. On the other hand, previous numerical studies showed that common X-ray spectral features of ULXs can be reproduced by the models of super-critically accreting steller-mass black holes. It is very important to reveal differences of the spectral features between super-critically accreting neutron stars and black holes, as well as their dynamics. Here, we present the results comparing dynamics and radiative spectra between super-Eddington accretion flows onto neutron stars and black holes, by performing general relativistic MHD simulations and by post-processing with general relativistic radiative transfer solver.

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