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On the properties of dissipative shocks in the relativistic accretion flows

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In this work, we study the properties of dissipative shocks for fully relativistic accretion flows around spinning black holes. In an accretion flow harbouring a dissipative shock (formally known as radiative shock), a significant portion of the thermal energy may get released from the post-shock corona. A stellar-mass black hole may therefore emit hard X-rays from the inner edge of the disc. If the bulk energy loss is significant, post-shock pressure drops, and shock moves forward towards the black hole compressing the size of the post-shock corona, resulting an enhancement of the corona temperature and compression ratio. The dynamical properties of the radiative shocks are therefore systematically investigated to understand accurately the radiative loss processes, temporal variations, and the spectral properties. We notice that the range of flow parameters (e.g. energy and angular momentum) responsible for the formation of 'shocks in accretion (SA)' is identical for both the cases of standing and dissipative
shocks. The spin of the black hole enhances the dissipation further. We estimate the maximum energy release, which is observed close to 100 per cent in the extreme cases. This could be useful in explaining various observed phenomena namely the formation and the systematic evolution of quasi-periodic oscillations, and the time lags in between hard and soft X-ray photons (e.g. XTE J1550−564, GRO J1655−40, etc.) during their outbursts.

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