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MHD Shocks in Accretion onto a Rotating Black Hole

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The formation of standing magnetohydrodynamical (MHD) shocks by accreting plasma in a black hole magnetosphere is studied. The black hole magnetosphere would be formed around a black hole with an accretion disk. The global magnetic field lines would be originated by currents in the accretion disk and its corona, and then some part of magnetic field lines would lead to the event horizon. Along such magnetic field lines magnetized plasma streams from the disk surface to the horizon, and on the way to the horizon MHD shock can be generated. Although the postshock plasma becomes very hot, the MHD shock can be expected as a source of high-energy radiation, which is generated very close to the horizon and then carry to us a lot of information of the black hole spacetime. We also discuss the huge energy release at the MHD shock front, where the plasma's kinetic energy and the black hole's rotational energy can convert to radiative energy by considering negative energy postshock MHD flows (Takahahi & Takahashi 2010). This means that the Blandford-Znajek (1977) power can convert to radiative energy at the MHD shock generated very close to the horizon.

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