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The Role of Fast Magnetic Reconnection on the Radio and Gamma-Ray Emission from the Nuclear Regions of Microquasars and Low Luminosity AGNs

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Fast magnetic reconnection events can be a very powerful mechanism operating in the core region of microquasars and active galactic nuclei (AGNs). In earlier work, it has been suggested that the power released by fast reconnection events between the magnetic field lines lifting from the inner accretion disk region and the lines anchored into the central black hole (BH) could accelerate relativistic particles and produce the observed radio emission from microquasars and low luminosity AGNs (LLAGNs). Moreover, it has been proposed that the observed correlation between the radio emission and the mass of these sources, spanning 10ˆ10 orders of magnitude in mass, might be related to this process. In the present work, since gamma-ray emission is correlated with the accelerated relativistic particles that produce the radio emission, we have compared the magnetic power released by fast reconnection with the observed very high energy emission (from MeV/GeV to Tev bands) of microquasars, LLAGNs, blazars, and gamma-ray bursts (GRBs). Considering magnetic reconnection driven by turbulence, we found that in the case of LLAGNs and microquasars, not only their radio but also the gamma-ray emission can be due to magnetic power released by fast reconnection. We have found also that the gamma-ray emission has a correlation with mass analogous to the radio, indicating that both are conected with reconnection events in the core region. On the other hand, the emission from blazars and GRBs does not follow the same trend, suggesting that their emission is produced outside the core, as expected. Complementary to these studies, we will also present results of numerical MHD simulations of a shearing-box reproducing fast magnetic reconnection events in the turbulent corona above a BH accretion disk.

Collaboration

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