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Thematic talk: Particle Acceleration and radiative cooling in blazar jets

Wednesday, 7 September 2022 14:00 (35 minutes)

Relativistic jets are a common manifestation of accreting black holes. Blazars are jets from supermassive black holes moving close to our line of sight. A common hypothesis for jet formation is that they are launched by powerful magnetic fields that thread the black hole. Here, I discuss the trip of the jet from the black hole to the much larger scales where it radiates. I argue that the jet emission is result of MHD instabilities that result in dissipation in the jet through the process of magnetic reconnection. I will review our latest understanding of the physics of magnetic reconnection and show that it could naturally produce the emitting plasmoids commonly invoked when modeling the blazar flares. Our 3D first-principle simulations of magnetic reconnection show that the dominant mechanism for (fast) particle acceleration involves particles that escape the current sheet and are accelerated by the large-scale electric field in the reconnection upstream. If the reconnection layers extend to a large fraction of the jet cross section, this mechanism can accelerate hadrons to ultra-high energies.

Collaboration

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