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Particle acceleration in strongly magnetised mildly relativistic shocks

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Jets in active galactic nuclei (AGN) are known for their intense X-ray and gamma-ray emission, originating from non-thermal particles. These sources are also linked to high-energy neutrino events and are considered potential sites of ultra-high-energy cosmic ray production. Accelerated particles can be generated in shock waves formed in collisionless AGN plasmas. We report on our recent studies of oblique mildly relativistic strongly magnetised shock waves in electron-ion plasma by utilising large-scale Particle-In-Cell (PIC) simulations. We show that oblique magnetized mildly relativistic shocks can efficiently accelerate both ions and electrons to very high energies. We discuss the mechanisms of ion and electron energisation in different regimes of the shock obliquity.

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