LORENTZ SYMMETRY VIOLATION AND ACCELERATION MECHANISMS AT VERY HIGH ENERGY

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Lorentz symmetry violation (LSV) at Planck scale can play a crucial role in astrophysical processes at very high energy. It can potentially inhibit radiation under external forces (e.g. synchrotron-like), GZK-like cutoffs, decays, photodisintegration of nuclei, momentum loss trough collisions (e.g. with a photon wind in reverse shocks), production of lower-energy secondaries... An updated description of this phenomenon is presented, discussing several approaches (including energy non-conservation) and focusing particularly on acceleration in relativistic shocks. On the grounds of models where the effective parameter driving LSV would vary like the square of the momentum scale (Quadratically Deformed Relativistic Kinematics, QDRK), we show that LSV leads to higher attainable energies and is consistent with astrophysical observations. Implications for ultra-high energy (UHE) neutrino production are equally discussed.