The role of turbulence strength on the acceleration of transrelativistic electrons

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Energetic particles are widely observed in many astrophysical systems, but the physical mechanisms responsible for their acceleration are not yet fully understood. We address the interaction of suprathermal, transrelativistic electrons with plasma turbulence at ion and sub-ion scales using a combination of hybrid particle-in-cell and test particle simulations. First, we present results of simulations with different turbulence amplitude. Two different mechanisms for electron energisation are identified: one is consistent with the picture of stochastic acceleration in turbulence, yielding to moderate electron energisation, while the other one involves electron trapping in turbulent structures, resulting in an efficient and fast electron energisation. The latter is observed to be active only for certain combinations of turbulence amplitude and electron initial energy. Furthermore, varying the injection scale, we explore the importance of the size of turbulent magnetic structures and of the nonlinear time associated to their dynamical evolution on electron acceleration. These results have important implications for electron acceleration in a wide range of space and astrophysical systems.