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Particle acceleration in stochastic magnetic fields

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Release of stored magnetic energy via particle acceleration is a characteristic feature of solar, magnetospheric and astrophysical plasmas. Here we examine the effect of the presence of stochastic magnetic field components on the acceleration of charged particles in magnetic reconnection. Particle distributions are obtained by numerically integrating individual charged particle orbits using a method developed for stochastic climate modeling. The resulting particle distributions depend on the scaling properties of the stochastic fields. Protons are accelerated from solar corona thermal energies to γ-ray producing energies in timescales of 1 second. The acceleration mechanism is possibly important for solar flares,solar noise storms, magnetospheric storms and is applicable to all collisionless plasmas.