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Transport and radiation of charged particles in chaotic, time dependent, force-free magnetic fields[1] B. DASGUPTA, CSPAR, U. Alabama, A. K. RAM, MIT — In regions of low plasma pressure and large currents, such as in solar corona, interstellar space, and gaseous nebulae, the magnetic fields are force-free as the Lorentz force vanishes. The three-dimensional, time-independent, Arnold-Beltrami-Childress (ABC) field is an example of a force-free, helical, magnetic field that is a mix of chaotic and regular field lines. The characteristic motion of particles in the chaotic field lines is chaotic and their transport is super-diffusive in space [1]. Charged particles in the ABC field emit electromagnetic radiation as well. We compare and contrast the radiation emitted by particles exhibiting regular motion with those having chaotic dynamics. For a time-dependent force-free magnetic field, Maxwells equations require that there be an associated electric field. Consequently, charged particles not only experience spatial transport but also energy transport. For a time-dependent ABC field, we find that the maximum energy a particle can gain is bounded from above. We will present results on the cross-field diffusion and energization of charged particles, and on the emission of radiation by these particles..
[1] A.K. Ram *et al.*, *Phys. Plasmas* **21**, 072309 (2014).

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