

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Time-Dependent Uniform Magnetic Fields and Non-Adiabatic Heating¹ J.D. MCDONNELL, Franklin and Marshall College / NUF, R.C. DAVIDSON, H. QIN, Princeton Plasma Physics Laboratory, Princeton University — It is well known that the magnetic moment of a charged particle moving in a magnetic field is an adiabatic invariant. As such, periodic changes in the magnetic field intensity, which are slow compared to the particle's gyrofrequency, produce no net change in the particle's kinetic energy. If the magnetic field varies rapidly, however, the magnetic moment is no longer conserved, and it becomes possible to affect the particle's kinetic energy. This possibility is investigated numerically and analytically for several configurations of periodically varying, solenoidal magnetic field. General effects on the particle's trajectory are explored, with particular attention paid to the response of a particle's kinetic energy to various initial conditions and magnetic field waveforms. The resulting analysis and further optimization could provide useful insights into a method of non-adiabatically heating the plasma in a nuclear fusion reactor.

¹Research Supported by the U.S. Department of Energy under contract No. DE-AC02-76CH03073.

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Date submitted: 21 Jul 2006

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