APR06-2006-000174

Abstract for an Invited Paper
for the APR06 Meeting of
the American Physical Society

Nonadiabatic Ponderomotive Barriers[1]

ILYA DODIN, Princeton University

A ponderomotive potential is an effective potential seen by a particle in ac field in average over the fast oscillations. It is not a true potential though, and, if the ac field is in resonance with particle natural oscillations, the particle can exhibit irreversible drift motion [1-3]. A new ponderomotive potential is found for this case that can capture nonadiabatic dynamics [4]. The particle drift in this new potential resembles the motion of a quantum object in a conservative field [5]. Among other applications, these nonadiabatic potentials can perform selective separation and cooling of plasma species or drive electric current by asymmetrically transmitting thermal particles in a preferential direction [1, 2, 6].

[1] N.J. Fisch, J.M. Rax, and I.Y. Dodin, Phys. Rev. Lett. **91**, 205004 (2003).
[2] I.Y. Dodin, N.J. Fisch, and J.M. Rax, Phys. Plasmas **11**, 5046 (2004).
[3] I.Y. Dodin and N.J. Fisch, J. Plasma Phys. **71**, 289 (2005).
[4] I.Y. Dodin and N.J. Fisch, Phys. Lett. A **349**, 356 (2006).
[5] I.Y. Dodin and N.J. Fisch, Phys. Rev. Lett. **95**, 115001 (2005).
[6] I.Y. Dodin and N.J. Fisch, Phys. Rev. E **72**, 046602 (2005).

[1]In collaboration with N. J. Fisch. The work is supported by DOE contract DE-AC0276-CHO3073.