

Abstract Submitted
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Ion mass separation by oscillating electromagnetic fields¹ AMNON FRUCHTMAN, GENNADY MAKRINICH, Holon Inst of Technology — It is shown that if the phase difference between oscillating electric and magnetic field is judiciously chosen, particles are accelerated. Moreover, the direction of acceleration depends on the particle mass, so that species of different mass are accelerated in opposite directions. Two configurations are addressed. One configuration is of a linearly-polarized electric and magnetic fields. In a second configuration, a steady axial magnetic field is added. For an appropriate phase difference, charged particles, the cyclotron frequencies of which lie on the two opposite sides of the cyclotron resonance, are accelerated in opposite directions. Ion collisions with neutrals cause a drift velocity of the ions. Surprisingly, the direction of the drift also depends on mass. Separation of particles of different mass, is a crucial process in a variety of societal applications [1-3]. In contrast to mass separation techniques that use ion cyclotron heating, the process described here does not require delivering a large energy to the ions. 1. W. E. Parkins, *Phys. Today* **58**, 45 (2005). 2. J. M. Dawson, *et. al.*, *Phys. Rev. Lett.* **37**, 1547 (1976). 3. S. J. Zweben, R. Gueroult, and N. J. Fisch, *Phys. Plasmas* **25**, 090901 (2018).

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