Abstract Submitted
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Collisional and Radiative Relaxation of Antihydrogen.[1] E.M. BASS, D.H.E. DUBIN, UCSD — Antihydrogen is produced in high-magnetic-field Penning traps by introducing antiprotons into a pure-positron plasma at cryogenic temperature T.[2,3] In the experimental regime, three-body recombination forms highly-excited atoms which exhibit classical guiding-center drift orbits.[4,5] Using energy transition rates obtained from a Monte-Carlo simulation, we track the collisional evolution of a distribution of atoms from binding energies near T to $U_c = e^2(B^2/m_e c^2)^{1/3}$, where atom dynamics is chaotic. While the flux through the kinetic bottleneck ($U = 4T$) is proportional to $T^{-9/2}$, data suggest that the flux at U_c (at a fixed time) does not scale strongly with T or magnetic field B. At U_c, radiation begins to take over as the principle energy-loss mechanism. Evolution due to radiation is tracked for a typical collisionally-evolved energy distribution to show that a small number of low-angular-momentum atoms radiate to the ground state rapidly, while others drop into slowly-radiating, circular orbits at intermediate energies.

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