Abstract Submitted
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The effects of extreme magnetic quadrupole and octupole fields on Malmberg Penning traps, and the consequences for anti-hydrogen trapping[1] JOEL FAJANS, WILL BERTSCHE, KORANA BURKE, STEVE CHAPMAN, ALON DEUTSCH, PATRICK KO, U.C. Berkeley and LBNL, DIRK VAN DER WERF, University of Swansea, ALPHA COLLABORATION — Recently, the ATHENA and ATRAP collaborations produced slow antihydrogen atoms at CERN. The neutral antihydrogen atoms are not confined by the charged-particle Malmberg-Penning traps used to confine the positrons and antiprotons from which the antihydrogen is made, so the atoms quickly annihilate on the trap walls. The most commonly suggested scheme to confine antihydrogen employs a diamagnetic, minimum-B neutral trap, typically produced by adding quadrupole and mirror fields to the solenoid field. The quadrupole fields destroy the cylindrical symmetry that underlies the Penning trap's outstanding performance, and the positrons and antiprotons might be lost before they form antihydrogen. This contention has been quite controversial; several papers have been published with opposing conclusions. Recent measurements at Berkeley establish that strong quadrupoles are indeed unacceptable. Theory and simulations suggest that octupoles would not destroy the charged particle confinement. Experiments with octupoles are planned this summer.

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