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Recent Progress on Antihydrogen Measurements From Advances in Plasma Physics[1] JOEL FAJANS, JONATHAN WURTELE, University of California, Berkeley, ALPHA COLLABORATION — The antihydrogen trapping rate in CERN's ALPHA experiment has gone from 0.1 antiatoms per hour to 300 antiatoms per hour in the last decade. The recent improvements in the trapping rate have come from improvements in the stabilization and manipulation of the pure-positron and pure-antiproton plasmas from which the antihydrogen is synthesized. In addition, ECR based magnetometry has reached the 1ppm level, increasing the accuracy of measurements on the antiatoms. Taken together, these advances have dramatically improved the speed at which certain measurements can be made; for example entire 1S-2S spectra can be taken in a day, a measurement that used to take weeks. The recent ability to have over 1000 antiatoms trapped simultaneously enables some measurements that previously could not be made at all; for instance, hyperfine measurements that would be too subject to magnet drifts if not taken over a few minutes. Further, laser cooling of antiatoms takes many hours; it would be impractical to cool just a few antiatoms at a time. This poster will review the recent plasma physics advances and some of the measurements they enable. The poster will also discuss nonlinear dynamics/plasma physics concepts that are central to the design of new experiments designed to measure the gravitational attraction of antiatoms to Earth.

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