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Evaporative cooling of antimatter plasmas for the production of trappable antihydrogen DANIEL MIRANDA SILVEIRA, Atomic Physics Laboratory, RIKEN (Japan) / Instituto de Física, UFRJ (Brazil), ALPHA COLLABORATION — Confinement of antihydrogen is likely required to achieve the goal of a sensitive test of CPT symmetry. Antihydrogen is produced from trapped plasmas of antiprotons and positrons and the chance of capturing it in a superposed magnetic trap can be maximized by the use of active cooling techniques for the charged plasmas. Forced evaporative cooling is a powerful technique for reducing the temperature of a sample bound to a potential well by removing the most energetic particles. Evaporation of antiproton plasmas held in Penning traps was pioneered by the ALPHA collaboration: temperatures as low as 9 K were obtained for samples containing initially 50,000 particles. More recently, evaporation was successfully applied to larger samples of positrons. The application of this technique to both species was instrumental in the recent demonstration of antihydrogen confinement. We describe our implementation of evaporation and its relevance for the observation of antihydrogen trapping. We present a model for the dynamics of evaporation as well as a discussion on the possible limits of the technique.

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