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Cooling by Spontaneous Decay of Highly Excited Antihydrogen Atoms in Magnetic Traps THOMAS POHL, HOSSEIN R. SADEGHPOUR, ITAMP, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, YUGO NAGATA, Institute of Physics, University of Tokyo, Japan, YASUNORI YAMAZAKI, Atomic Physics Laboratory, RIKEN, Japan — An efficient cooling mechanism of magnetically trapped, highly excited antihydrogen atoms is presented. This cooling, in addition to the expected evaporative cooling, results in trapping of a large number of atoms in the ground state, essential for future antihydrogen trapping experiments. In good agreement with our numerical simulations, we identify two different dynamical regimes - adiabatic cooling followed by sudden de-excitation. Moreover we derive expressions for the cooling efficiency, which may help to design trap geometries with optimized groundstate trapping.

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