Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Nuclear Charge Radius of ^{8}He[1] P. MUELLER, I.A. SULAI, K. BAILEY, R.J. HOLT, R.V.F. JANSSENS, Z.-T. LU, T.P. O'CONNOR, Argonne National Lab, A.C.C. VILLARI, J.A. ALCANTARA-NUNEZ, M. DUBOIS, C. ELEON, G. GAUBERT, N. LECESNE, M.G. SAINT-LAURENT, J.C. THOMAS, R. ALVES-CONDE, GANIL, G.W.F. DRAKE, University of Windsor, L.-B. WANG, Los-Alamos National Lab — ^{8}He is the most neutron-rich matter to have been synthesized on Earth: it consists of two protons and six neutrons, and remains stable for an average of 0.2 seconds. It is often viewed as a ^{4}He core with four additional neutrons forming a neutron halo. Because of its intriguing properties, ^{8}He has the potential to reveal new aspects of the fundamental forces among the constituent nucleons. We have recently succeeded in laser trapping and cooling this exotic helium isotope, and have performed precision laser spectroscopy on individual trapped atoms. Based on the frequency shifts of atomic transitions measured along the isotope chain ^{4}He - ^{6}He - ^{8}He, the nuclear charge radius of ^{8}He has been determined for the first time. Comparing this result with the values predicted by a number of nuclear structure calculations, we test theoretical understanding of the nuclear forces in the extremely neutron-rich environment.

[1]This work is supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357.

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Date submitted: 06 Jul 2009 Electronic form version 1.4