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Towards a Laser Spectroscopic Determination of the ^{8}He Nuclear Charge Radius[1] P. MUELLER, K. BAILEY, R.J. HOLT, R.V.F. JANSSENS, Z.-T. LU, T.P. O'CONNOR, I. SULAI, Argonne National Lab, M.-G. SAINT LAURENT, J.-CH. THOMAS, A.C.C. VILLARI, GANIL, O. NAVILIAT-CUNCIC, X. FLECHARD, Laboratoire de Physique Corpusculaire Caen, S.-M. HU, University of Science and Technology of China, G.W.F. DRAKE, University of Windsor, M. PAUL, Hebrew University — We will report on the progress towards a laser spectroscopic determination of the ^{8}He nuclear charge radius. ^{8}He ($t_{1/2}$ = 119 ms) has the highest neutron to proton ratio of all known isotopes. Precision measurements of its nuclear structure shed light on nuclear forces in neutron rich matter, e.g. neutron stars. The experiment is based on our previous work on high-resolution laser spectroscopy of individual helium atoms captured in a magneto-optical trap. This technique enabled us to accurately measure the atomic isotope shift between ^{6}He and ^{4}He and thereby to determine the ^{6}He rms charge radius to be 2.054(14) fm. We are currently well on the way to improve the overall trapping efficiency of our system to compensate for the shorter lifetime and lower production rates of ^{8}He as compared to ^{6}He. The ^{8}He measurement will be performed on-line at the GANIL cyclotron facility in Caen, France and is planned for late 2006.

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