We have succeeded in laser trapping and cooling of the exotic helium isotopes $^6\text{He}$ ($t_{1/2} = 0.8$ sec) and $^8\text{He}$ ($t_{1/2} = 0.1$ sec), and have performed precision laser spectroscopy on individual trapped atoms. Based on the atomic isotope shifts measured along the isotope chain $^3\text{He} - ^4\text{He} - ^6\text{He} - ^8\text{He}$, and on the precise theory of the atomic structure of helium, the nuclear charge radii of $^6\text{He}$ and $^8\text{He}$ are determined for the first time in a method independent of nuclear models [1, 2]. The results are compared with the values predicted by a number of nuclear structure calculations and test their ability to characterize these neutron rich, loosely bound halo nuclei. The $^6\text{He}$ measurement was performed at ATLAS of Argonne, and the $^8\text{He}$ measurement at GANIL, France. This work was supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357.
