

# **Nuclear Seminar**

October 8<sup>th</sup> @ 2:00 PM in RM 179

## ***Laser Trapping and Probing of Exotic Helium Isotopes***

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  ${}^4\text{He} - {}^6\text{He} - {}^8\text{He}$ , 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. 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. For the future, we propose to study beta-neutrino correlations in the decay of laser trapped  ${}^6\text{He}$  atoms. In particular, this measurement would be sensitive to possible tensor couplings in the weak interaction.

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