Laser spectroscopy and mass spectrometry studies of halo nuclei with COLLAPS and ISOLTRAP

K. Blaum *for the IS413 and IS427 collaborations at ISOLDE-CERN*

Institut für Physik, Johannes Gutenberg-Universität Mainz, D-55099 Mainz, Germany
GSI Darmstadt, Planckstr. 1, D-64291 Darmstadt, Germany

The extension of our knowledge at the limits of the nuclear chart is an important goal of research in nuclear physics since it provides a sensitive probe of the forces holding nuclei together. In that respect, one of the surprises in the light mass region of the nuclear chart, discovered by Tanihata *et al.* [1], was the existence of halo nuclides: A particularly interesting phenomenon that occurs close to the proton and neutron drip-line where one or more weakly bound protons or neutrons, respectively, form a dilute cloud around a central nuclear core [2]. Since this first discovery of the large nuclear matter distribution of the neutron halo ^{11}Li, a large number of precision measurements of "halo" indicators as, *e.g.*, electric quadrupole moments, nuclear charge radii and nucleon separation energies, have been performed on other halo candidates as well. Recent results from two experiments located at ISOLDE-CERN will be presented: high-precision mass measurements on the proton halo ^{17}Ne [3] performed with the Penning trap mass spectrometer ISOLTRAP [4], and nuclear magnetic and quadrupole moments measurements on ^{9,11}Li [5] and ^{17}Ne performed with the collinear laser spectroscopy setup COLLAPS.

[1] I. Tanihata *et al.*, Phys. Rev. Lett. 55 (1985) 2676
[2] P.G. Hansen, A.S. Jensen and B. Jonson, Annu. Rev. Nucl. Part. Sci. 45 (1995) 591
[3] A. Herlert *et al.*, FINUSTAR Conference, Kos, Greece, 2005, AIP Conference Proceedings, accepted (2006)
[4] K. Blaum, Phys. Rep. 425 (2006) 1
[4] D. Borremans *et al.*, Phys. Rev. C 72 (2005) 044309