First mass measurements at TITAN.

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Precision mass measurements of the short-lived isotopes are crucial for tests of the weak interaction (CKM matrix). They will also be called upon to help map out the origins of the elements when the new generation of radioactive ion beam facilities comes online. Recently an exotic group of short lived nuclei, the *halo nuclei* are in the focus of nuclear physics research. Such nuclei are comprised of relatively few nucleons, making them approachable by stringent *ab initio* nuclear structure calculations. At the same time they test extreme boundaries of the nuclear interactions. Masses of several such nuclei were measured in Fall 2007 and Spring of 2008 using newly commissioned TITAN Penning trap mass spectrometer at ISAC rare isotope beam facility of TRIUMF National laboratory. Halo nucleus ^{8}He was found to be 13keV less bound[1] than previously believed. We were also able to accurately determine the mass of another halo nucleus, ^{11}Li, despite its extremely short lifetime ($\tau_{1/2} \approx 8.8$ms). Together with the high precision isotope shift measurements[2, 3] and atomic structure calculations[4] these mass measurements help in understanding the nuclear structure of these isotopes. Anticipating the upcoming isotope shift measurement of ^{11}Be halo nucleus we have measured its mass. We have greatly improved precision of the ^{11}Be mass determination which will be important for interpretation of the isotope shift measurement results. These measurements were made possible by the advanced rare isotope production capabilities of TRIUMF and the design of TITAN facility specifically targeting short-lived isotopes.

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