Contribution ID : **22** Type : **not specified**

Symmetries in proton-rich nuclei seen through ground-state properties

Tuesday, 22 February 2011 18:45 (25)

Light proton-rich nuclei are valuable objects to study various symmetries in nuclear systems: fundamental symmetries with superallowed decays, proton-neutron isospin symmetry, or shapes, i.e. the geometrical symmetry.
Ground-state property measurements, such as these performed at ISOLDE with laser spectroscopy and Penning-trap mass spectrometry, contribute to this topic. In this contribution I will present recent investigations using the COLLAPS and ISOLTRAP setups which cover masses, moments, and charge radii of proton-rich Ne, Mg, and K isotopes.
Symmetries are addressed in multiple ways: Magnetic moments of 21Mg and 17Ne allow studying the isospin symmetry. Charge radii of both isotopic chains reveal a wealth of geometrical phenomena, from proton halos to alpha-clustering, when adding only a few neutrons. The mass of 35K gives evidence for a breakdown of the isobaric multiplet mass equation and the precise mass of 22Mg contributes to the determination of the Vud matrix element.

Summary

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Session Classification : Tuesday February 22nd, 2011. 17:30 - 19:10