Isospin mirror asymmetry as an evidence of proton halos?*

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Isospin mirror asymmetry in mirror systems along the *sd* shell has been suggested to be an evidence of proton halo structure. Two recent examples are the ^{27}Na-^{27}S and the ^{22}Si-^{22}O pairs, where the recently reported asymmetry could point, respectively, to proton halos in ^{27}S [1] and ^{22}Al [2] (the β^+-decay daughter nucleus of ^{22}Al). This would open an extremely interesting possibility of identifying halo structures by means of β-decay studies, specially for proton halos, where there is a scarcity of confirmed cases.

However, the isospin mirror asymmetries found could also be connected with the incompleteness of the decay data of the neutron rich partners. Following this line, we have started an experimental campaign of measurements at ISOLDE to study in detail the decays of ^{27}Na and ^{22}O [3].

In this contribution we will focus on a recent experiment with the Lucrecia total absorption spectrometer at ISOLDE aimed at investigating the β decay of ^{27}Na. Previous studies of this decay were carried out with germanium detectors [4], for which the determination of β intensities is known to be hampered by the Pandemonium effect [5], specially when high excitation-energy levels are fed and de-excitation cascades are very fragmented. A high efficiency detector as Lucrecia [6] has proved the capabilities of the total absorption gamma-ray spectroscopy (TAGS) technique to determine the complete β intensity distributions.

We will discuss the previously unseen β intensity found for the decay of ^{27}Na and its impact on the isospin mirror asymmetry evaluation for the ^{27}Na-^{27}S mirror pair. In addition, our new experimental study points to a previously unseen competition between neutron emission and gamma de-excitation above the neutron separation energy, in the line of calculations performed for this decay based on a Hauser-Feshbach statistical model [7].

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