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Decay studies

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For nuclei far from stability the differences in isobaric masses increases quadratically and the binding energy of the last nucleon decreases dramatically making beta-delayed particle emission the dominant decay channel at the drip lines.

Beta decay is a well understood process and allows for a wide variety of spectroscopic information to be extracted from experiment: level energies, widths, spins, isospins and level densities. Via this process and detailed studies of the particle emission our understanding of nuclear structure and nuclear dynamics can be tested even in rare drip line nuclei. Some phenomena, such as multi-particle emission, are unique to these very exotic nuclei.

The key nuclei to understand how a complex system can be constructed from a few ingredients are often the very neutron or proton rich, since such exotic systems allow to isolate and amplify specific aspects of the nucleonic interactions. For instance, some of them uniquely display the physics of loosely bound quantal systems governed by the strong interaction. Decay studies can be performed with very low yields and the very selective rules they obey make them a powerful and unique tool in such nuclear structure studies.

In this presentation some key nuclei will be presented and it will be shown how the combined use of pure beams from ISOLDE, a selective and clean probe - the beta decay- and state of art detection system has allowed to answer some of the questions mentioned above. Some possibilities for future studies of this type will be outlined.

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