Nuclear Seminar

Modifications of the Nuclear Shell Structure: Spectroscopy in Islands of Inversion

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Room 124 Nieuwland Science Hall

One of the major successes in the description of the properties of atomic nuclei was the introduction of the nuclear shell model. The magic numbers associated with closed shells have long been assumed to be valid over the whole nuclear chart. In the last decades it was found that the well-known magic numbers for atomic nuclei can change locally when going from the valley of stability to nuclei with extreme N/Z ratios, leading to the disappearance of classic shell gaps and the appearance of new magic numbers. This evolution of the magic numbers is one of the major topics in both experimental and theoretical nuclear structure research. Modifications of the nuclear shell structure can lead to unexpected phenomena, such as the occurrence of deformed ground states in so-called "Islands of Inversion". These changes in nuclear structure have a vast impact on the binding energies of nuclei, their decay properties, as well as on their excitation-energy spectra. Understanding the underlying phenomena causing these changes is of great importance to be able to reliably extrapolate nuclear structure properties towards the drip-lines.

In this talk I will present recent results from in-beam gamma-spectroscopy experiments using the GRETINA array at the NSCL. Detailed spectroscopy of neutron-rich nuclei around N=20 and 40 shed new light on the evolution of nuclear shell structure in exotic nuclei.

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