**Institut de Recherche sur les lois Fondamentales de l'Univers**

**Département de Physique Nucléaire**

## Séminaire ESNT-DPhN

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Bât 703, room 135 DPhN CEA Saclay, Orme des Merisiers


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# The Islands of Inversion from the Nilsson perspective

The structure of exotic neutron-rich nuclei is one of the main science drivers in contemporary nuclear physics research. Our current knowledge of nuclear structure towards the driplines, has clearly established that the paradigm of magic numbers and doubly magic nuclei as we know it near stability changes across the nuclear landscape. Changes in the underlying single-particle structure are intimately related to specific aspects of the effective nuclear force, specifically to its central and tensor components.
Thus, a detailed mapping of shell evolution and collectivity at the limits of isospin becomes a key element to understand the atomic nucleus and all its many-body intricacies.

The so-called Islands of Inversion at N= 8, 20, and 40 provide dramatic examples of the evolution of shell structure and collectivity, with its underlying physics mechanism driven by the important role of the neutron–proton force. The effect of isospin on the monopole average of the central and tensor components of the force changes the neutron effective single-particle energies (ESPEs) in such a way that expected shell closures are quenched, opening the door for the collective degrees of freedom to become relevant in the low-lying excitation spectra of these systems, where single-particle excitations were anticipated. Much experimental evidence has been obtained confirming the existence of deformed ground states.

In this seminar, we will discuss the nuclei within the Islands of Inversion in the collective model. Our focus will be on the Nilsson assignments of the relevant single-particle states and the predicted level structures and electromagnetic properties. Special emphasis will be given to the comparison of spectroscopic factors, derived from direct reactions measurements that directly probe the wave functions.