Contribution ID: **5** Type: **Contributed Oral Presentation**

Shape coexistence in 94-96Zr from low energy Coulomb-excitation experiments with the AGATA-SPIDER array.

Tuesday, 27 May 2025 08:55 (15 minutes)

The study of shapes and collective properties of atomic nuclei is a vast area of research, and low-energy Coulomb-excitation is one of the most powerful experimental techniques for such studies. It provides information not only about the reduced transition probabilities, describing the collectivity of the transitions, but also about the spectroscopic quadrupole moments of excited states, as well as the relative signs of the extracted transitional and diagonal matrix elements.
Typically, following low-energy Coulomb-excitation experiments, a set of matrix elements is determined allowing for the use of the Kumar–Cline's sum rules that permit the determination of the deformation parameters together with their widths.
Coulomb excitation measurements have been performed to study structural changes and the presence of coexisting shapes in the zirconium isotopes, which are particularly interesting as, in recent years, evidence has come to light that they are excellent cases for exhibiting type II shape evolution.
In most cases, however, the nuclear matrix elements required to perform precision tests of state-of-the-art nuclear theory in this region are lacking.
For this reason we decided to perform Coulomb excitation measurement allowing for an in-depth comparison with theoretical predictions, shedding light on the structure of low-lying excitations in these nuclei.
In this talk, our experimental results will be presented focusing on the Coulomb-excitation measurement performed on the 94-96Zr isotope using the γ-ray tracking spectrometer AGATA coupled with the heavy-ion detector array SPIDER at INFN-LNL.

Consent

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Session Classification: Parallel Session

Track Classification: Nuclear Structure