Contribution ID: **58** Type: **Submitted oral (In person)**

Evolution of the one-phonon mixed-symmetry 2+ state in the N=80 isotones

Thursday 28 November 2024 09:45 (12 minutes)

The formation of nuclear quadrupole collectivity and the contributions of valence protons and neutrons to it is a vivid research field in contemporary nuclear structure physics, including activities at the ISOLDE facility. The excited proton and neutron configurations can couple to predominantly isoscalar and isovector excitations of the nuclear valence shell. The latter are addressed as having mixed symmetry. The simplest mixed-symmetric configuration in vibrational nuclei is the $2^+_{1,\mathrm{ms}}$ state. Its evolution in the N=80 isotones from ^{132}Te to ^{142}Sm has been of great interest for the past two decades [1,2,3,4,5]. Data on the $2^+_{1,\mathrm{ms}}$ state in this isotonic chain is complemented with a recent Coulomb-excitation experiment of ^{142}Sm at HIE-ISOLDE in combination with an angular correlation measurement after two β-decays performed at Heavy Ion Laboratory (HIL), Poland, in order to determine multipole mixing ratios of low-lying $2^+_i \rightarrow 2^+_1$ transitions. From the absolute matrix elements, the isolated $2^+_{\mathrm{ms},1}$ state of ^{142}Sm has been determined for the first time, supporting the concept of valence-shell stabilization as proposed by Rainovski *et al.* [4]. A final account of the recently finished data analysis will be given.

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Session Classification: Recent Experimental Results I