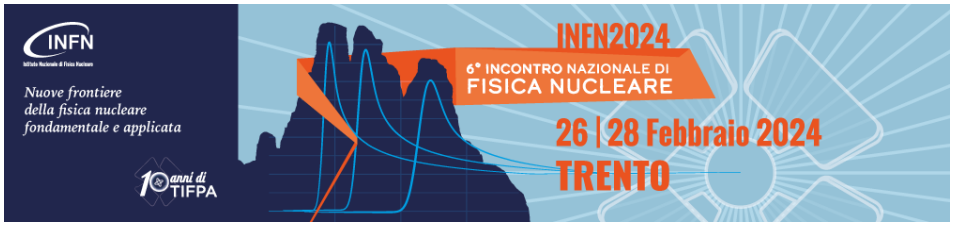

Contribution ID: **58** Type: **flash talk**

Evolution of the mixing between single-particle and intruder configurations approaching the island of inversion at N=20: lifetimes in 37S

Monday, 26 February 2024 16:25 (5 minutes)

The disappearance of the N=20 shell closure in the so-called "island of inversion"around ^{32}Mg is one of the most striking examples of the strength of nucleon-nucleon correlations. In this region, the quadrupole-deformed intruder configuration (based on a multi-particle multi-hole configuration) becomes the ground state, subverting the expected shell ordering predicted by a harmonic oscillator plus spin-orbit term. The odd N=21 isotones therefore yield the possibility of a direct investigation of the mixing between single-particle and intruder states along the same chain, although experimental study of such nuclei becomes increasingly difficult with decreasing Z. Available spectroscopic evidence suggests that in ^{37}S the single-particle and collective intruder configurations are strongly connected, thus placing ^{37}S at the upper edge of the island of inversion. However, information on observables directly related to the wavefunction composition is rather scarce. The first excited state ($3/2^-$ state at 646 keV) is the only one with a measured lifetime, but no transition probability has been firmly determined for intruder states, in particular those connected with strong branching ratios to the a priori spherical single-particle states.
A combined DSAM+RDDS measurement has been performed at LNL to deduce such transition probabilities, in particular for the $3/2^+$ state at 1397 keV (2p-1h nature) and the $7/2^-$ at 2023 keV (3p-2h nature), exploiting the full performance of the AGATA spectrometer in terms of energy and angular resolutions. The ^{37}S nucleus has been produced via the ^{36}S(d,p) reaction in inverse kinematics, detecting the recoiling protons in the annular charged-particle silicon detector SPIDER to obtain an accurate reconstruction of the excitation energy of ^{37}S. This contribution will present preliminary results which provide new insights into the structure of this nucleus.

Primary authors: GOTTARDO, Andrea (Istituto Nazionale di Fisica Nucleare); GALTAROSSA, Franco (Istituto Nazionale di Fisica Nucleare); VALIENTE DOBON, Jose' Javier (Istituto Nazionale di Fisica Nucleare); ZAGO, Luca (Istituto Nazionale di Fisica Nucleare)

Presenter: ZAGO, Luca (Istituto Nazionale di Fisica Nucleare)

Session Classification: Nuclear Structure and Reactions I