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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 ordering 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 to measure such transition probabilities, in particular for the $3/2^+$ state at 1397 keV (1p-1h nature) and the $7/2^-$ at 2023 keV (2p-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 $^{36}\text{S}(d,p)$ reaction in inverse kinematics, detecting the recoiling protons in SPIDER to obtain an accurate reconstruction of the excitation energy of ^{37}S .

This contribution will show the status of the analysis and some preliminary results obtained so far

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