

BREAKING THE SHELLS IN NEUTRON-RICH NUCLEI, AN EXPERIMENTAL STUDY OF ^{44}S AND ^{20}O

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A short review of the results of two experiments to study the nuclear structure of the neutron-rich nuclei ^{44}S and ^{20}O will be presented.

- The neutron-rich nucleus ^{44}S was studied using the two-proton knockout reaction from ^{46}Ar at intermediate beam energy. The experiment was performed at NSCL using SeGA and the S800. Four new excited states were observed, of which a state with $J^\pi = 4^+$ is predicted to be prolate deformed by shell-model calculations. Its deformation originates in a neutron configuration of 1p-1h which is fundamentally different from the “intruder” (2p-2h) configuration producing the ground state deformation and the “normal” (0p-0h) configuration of the 0^+ isomeric state.
- The energetic location of the $d_{3/2}$ -orbital in neutron-rich nuclei is of particular interest as it determines the position of the drip-line in the oxygen isotopes. Its behavior has recently been discussed as a consequence of three-body forces. In order to study the location and fragmentation of the $d_{3/2}$ orbital in ^{20}O we performed two experiments at Florida State University using the (d, p) reaction in inverse kinematics. These experiments are part of a campaign to commission the new ANASEN detector array.