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Structure of 33 Si, 35 S and 36 S nuclei and the N=20 shell gap

The project focuses on studying the evolution of the N=20 shell gap. The shell gaps have been previously investigated through studies of nuclear levels, using various experimental approaches namely: Coulomb excitation, knockout reactions, transfer reactions and g-factor measurements. In exotic nuclei with an imbalanced number of neutrons and protons, significant modifications of the nuclear structure have been observed. A detailed study of the evolution of the shell gaps will lead to a comprehensive understanding of the structure of atomic nuclei. In order to investigate the evolving shell structure, it is necessary to determine single particle observables such as spectroscopic factors of the states involving the active
orbitals at these shells gaps. A knockout reaction is the first set of data for this project, the experiment was performed at MSU/NSCL laboratory using the GRETINA gamma-ray tracking array and S800 spectrometer. The knockout reaction was performed using inverse kinematics with a ³⁶S secondary beam incident on a ⁹Be target. The nuclei of interest studied are ³³Si, ³⁵S and ³⁶S. Various transitions in these nuclei have been identified from the analysis of add-back Doppler corrected spectra and a level scheme has been built from the resulting analysis. In addition, parallel momentum distributions have been constructed to investigate the possible nature of the different states.

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