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Study the isomeric state of ^{16}N via the $^{16}\text{N}^{g,m}(d, ^3\text{He})$ reaction

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We report the result of a study of the isomeric state in ^{16}N via the $^{16}\text{N}^{g,m}(d, ^3\text{He})^{15}\text{C}$ reaction in inverse kinematics at 11.8 MeV/u using the HELIOS spectrometer. The radioactive ^{16}N beam, with a 24(2)% isomer component, was produced using the ATLAS RAISOR in-flight separator at ANL. The simultaneous measurements of the reactions provided the most direct and reliable comparison of the spectroscopic factors due to the cancellation of most of the systematic uncertainties from the experiment and DWBA theory. The ratio of the spectroscopic factors between the $^{16}\text{N}^g \rightarrow ^{15}\text{C}(0.74)$ and $^{16}\text{N}^m \rightarrow ^{15}\text{C}(0.00)$ reactions was found to be 0.82 ± 0.22 . The result indicates that the s-orbital between $^{16}\text{N}^m$ and ^{15}C ground state is similar and the isomer state of ^{16}N is an excited neutron halo state.

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