

GT strength starting from $^{14}\text{N}_{g.s.}$

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High resolution charge exchange reactions performed at intermediate beam energies represent an unique tool to study the Gamow Teller (GT) strength distribution among individual states. Numerous nuclear structure problems can be addressed via the simple GT transitions.

Our study makes use of charge exchange reactions to address a very long-standing puzzle in beta decay: the remarkable suppression of the GT strength between the ground state of ^{14}N and the ground states of ^{14}C and ^{14}O .

Two mirror experiments were performed: the $^{14}\text{N}(d,^2\text{He})^{14}\text{C}$ reaction was investigated at KVI, Groningen and the $^{14}\text{N}(^3\text{He},t)^{14}\text{O}$ reaction was studied at RCNP, Osaka.

The comparison of the experimental results with Large Scale Shell Model calculations made it possible to move a step forward in the understanding of the Gamow Teller transitions within the $A=14$ nuclear system. The theory predicts that, if the ground state to ground state transition is suppressed, the GT strength starting from $^{14}\text{N}_{g.s.}$ should excite selectively $J^\pi=2^+$ states in ^{14}C and ^{14}O . The experimental confirmation of this result represents a validation of the theoretical assumptions about the structure of the wave function of $^{14}\text{N}_{g.s.}$. However, the fragmentation of the strength over three 2^+ final states remains an essential aspect not explained by the Shell Model.