

# Service de Physique Nucléaire



## Séminaire

**Vendredi 19 mai 2006 à 11h00**

CEA Saclay, DSM/DAPNIA/SPhN

Orme des Merisiers, Bât. 703, Salle 135

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### **Study of (d, <sup>2</sup>He) and (<sup>3</sup>He, t) charge exchange reactions on <sup>14</sup>N and <sup>64</sup>Ni**

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The charge-exchange reactions performed at intermediate energies represent a unique opportunity for studying the collective excitations in nuclei. The most simple excitation of the spin and isospin degrees of freedom of a nucleus is called a Gamow-Teller (GT) excitation ( $\Delta J^\pi = 1^+$ ,  $\Delta L = 0$ ,  $\Delta S = 1$ ,  $\Delta T = 1$ ) It is very analogous to similar  $\Delta L=0$  transitions in beta decay.

Its investigation is an opportunity to study a few basic features of the nuclear force due to the very simple excitation mechanism. It is well-known that beta decay studies suffer from the Q-limitation, while the limited resolution of (p, n) or (n, p) - type charge-exchange reactions made it difficult in the past to determine the GT strength distribution for individual final levels. With the improved resolution obtained in the (n, p)-type (d, <sup>2</sup>He) reaction ( $\approx 100$  keV) and in the (p, n)-type (<sup>3</sup>He, t) reaction ( $\approx 35$  keV) this goal is now achievable.

We will report here on two particular cases where the very good energy resolution obtained in these two reactions makes possible a step forward in the understanding of certain key features:

1. The GT strength distribution starting from the ground state of <sup>14</sup>N in both  $\beta^+$  and  $\beta^-$  directions reveals basic aspects of the applicability of the Shell Model and its interplay with other models.
2. The GT excitations starting from the Ni isotopes deliver important ingredients for the astrophysical models, where fp-nuclei like <sup>64</sup>Ni play a very important role in the early stage of the collapse of supernovae and can reveal also interesting nuclear structure aspects.

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*Le café sera servi 15 minutes avant*

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