



Séminaire le vendredi 18 septembre 2009 à 14h00

CEA-Saclay SPhN, Orme des Merisiers Bât. 703 Salle 135

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**GAMOW-TELLER TRANSITIONS:**

**Implications for supernova scenarios and double-beta decay**

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Gamow-Teller (GT) transitions, aside from their interest from the nuclear structure point of view, play very important roles in various phenomena in nature. In nucleosynthesis, the  $\beta$ -decay of nuclei along the s- and r-processes determine the paths that these processes follow and the abundances of the elements synthesized. In supernova collisions, GT transitions are of paramount importance in the pre-supernova phase where electron capture occurs on neutron-rich  $fp$ -shell nuclei at the high temperatures of giant stars. Electron capture is mediated by GT transitions. Electron capture removes the electron pressure that keeps the star from collapsing precipitating a cataclysmic implosion followed by a huge explosion throwing much of the star material into space and leaving a neutron star or black hole behind. In  $2\nu 2\beta$ -decay, virtual GT transitions via  $1^+$  states of the intermediate nucleus, determine the rate and therefore the lifetime of  $2\beta$ -decaying nuclei. The  $0\nu 2\beta$ -decay is much more interesting since if it occurs it establishes the Majorana character of the neutrino and allows a determination of its mass. However, a good determination of the matrix element connecting both ground states is important. Here, in addition to GT transitions that are important in  $2\nu 2\beta$ -decay, higher multipolarity spin-isospin modes play an important role in determining this matrix element. Experimental aspects of this will be discussed.

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Le café sera servi 10 minutes avant, en salle 125  
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