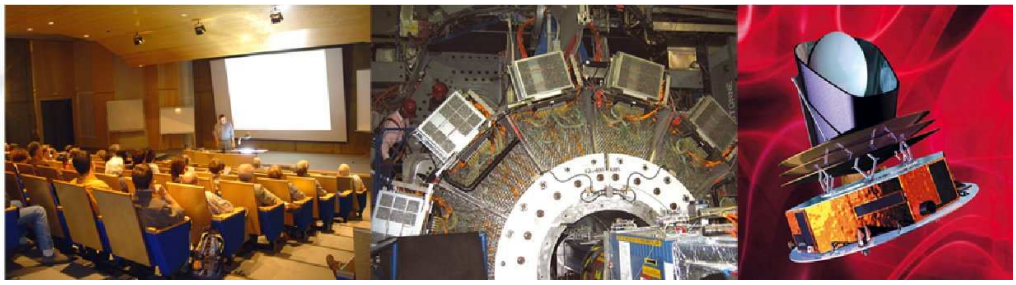
LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE



Séminaire du Laboratoire de l'Accélérateur Linéaire

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Ganil (Caen)

Mardi 26 Avril 2016 à 11 :00

A bubble nucleus to probe the spin-orbit force in extreme conditions

The spin orbit (SO) force plays a crucial role in nuclear structure to create most of the shell gaps and magic nuclei. It is essential as well to account for a possible island of stability in the superheavy nuclei(SHE) as well as to model explosive stellar nucleosynthesis (such as the rapid neutron capture process- the r-process) in which the main survivors are magic nuclei. This force has been postulated more than 60 years ago, and theoretical descriptions in the framework of relativistic mean field model now exist to describe it. Models predictions are however differing significantly towards the drip line for more than 40 years, leading to large uncertainties on where to find enhanced stability for SHE, as well as on the onset of the r-process in stars that lead to the synthesis of a large fraction of elements heavier than Fe in the universe. We propose to study for the first time the unknown components (density and isospin dependence) of the SO force by using the doubly-magic bubble nucleus 34Si, in which a central proton density depletion is present, forming in a sense a central bubble.

The one-proton (neutron) knockout reaction was used from a 34Si radioactive beam at the NSCL/MSU (USA) facility to determine its proton (neutron) density profile, based on the measured occupancies of the proton (neutron) orbits. The 33Al (33Si) residues were identified by the S800 spectrometer in coincidence with their gamma-rays detected in the Gretina array. From this experiment a significant central proton depletion was observed in 34Si as compared to 36S.

In a second experiment a significant change of the neutron SO between a normal nucleus 36S and the bubble nucleus 34Si was evidenced by using the neutron adding (d,p) reaction at the GANIL facility in Caen in combination with Si and Ge arrays.

Consequences related to these discoveries will be discussed in the conclusion.

Salle 101 du LAL - Bât. 200, Orsay

Thé et café seront servis 5 mn avant le séminaire

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