**Département de Physique Nucléaire**

Séminaires du DPhN

Lundi 16/03/2015, 11:00-12:00

Bat 703, p 45, CEA Saclay, Orme des Merisiers


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## Study of three-nucleon force - old but new forces in nuclei -


One of the main interests in nuclear physics is understanding the forces acting between nuclear constituents. A hot topic of nuclear force study is exploring the properties of threenucleon forces (3NFs) that appear when more than two nucleons (A > 3) interact. Existence of 3NFs has been predicted since Yukawa's meson theory. However it is hard to find the evidences experimentally since these forces are easily masked by two-nucleon forces.

In the past decade substantial progress was made in descriptions of various phenomena of nuclei, by explicitly taking into account nucleon-nucleon (NN) forces. The results of comparison to the experimental data for binding energies of nuclei, equation of state of nuclear matter and three-nucleon scattering, strongly indicate the importance of 3NFs.

Three-nucleon (3N) scattering, for which a rigorous formulation in terms of Faddeev equations exists and exact solutions of these equations for any dynamical input can be obtained, offers a good opportunity to study the dynamical aspects of 3NFs, such as momentum, spin dependences. An indication of 3NF for the 3N scattering was first pointed out in the cross section minima for nucleon-deuteron elastic scattering at intermediate energies (E/A > 60 MeV) in 1998. Since then we have performed experimental studies of proton-deuteron (pd) elastic scattering covering incident energies of up to ~ 300 MeV with polarized deuteron beams at RIKEN, providing precise data of cross sections and spin observables.

In the seminar, I will present how we tackled 3NFs experimentally and current status of our investigation.


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