Service de Physique Nucléaire

Séminaire le vendredi 22 juin 2007 à 11h

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

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**Les réactions directes avec les faisceaux radioactifs aux énergies intermédiaires**

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Over the past ten years, the removal of nucleons via knockout reactions in inverse kinematics at intermediate energies (> 50 MeV/n) has become an important tool for studying the single-particle occupancies of stable and exotic nuclei [1]. Knockout reactions performed in inverse kinematics have been useful in observing exotic nuclei because targets of exotic nuclei are difficult or impossible to make. Single nucleon knockout reactions such as $^{9}Be(^{A}Z,^{A-1}Z)X$ and $^{9}Be(^{A}Z,^{A-1}Z\text{-}1)X$ have been particularly useful in the study of nuclei near the proton and neutron driplines because of their relatively high cross section [1,2]. These reactions probe the structure of a given nucleus by populating its single nucleon-hole states. However, these reactions do not probe the single particle states of these nuclei. Thus, nucleon pickup reactions of the type $d(^{A}Z,^{A+1}Z+1)n$ and $d(^{A}Z,^{A}Z+1)p$ should also be investigated to complete the study of the single particle structure of a given nucleus. Such information will help test the validity of the single particle shell model and other models for exotic nuclei. In an experiment at the National Superconducting Cyclotron Laboratory (NSCL), the total cross sections for the sample pickup reactions $d(^{48}Ca,^{49}Sc)n$, $d(^{48}Ca,^{49}Ca)p$, $d(^{40}S,^{41}Cl)n$, and $d(^{42}S,^{43}Cl)n$, at intermediate energies (100 MeV/n) were measured 1) to see if future experiments of this type are feasible and 2) to investigate the reaction mechanisms to see if useful nuclear structure information can be obtained from these reactions at these energies. The total cross sections for these nucleon pickup reactions were compared to calculations of the cross section with the Johnson–Soper adiabatic model [3] to determine whether the residual nuclei are populated via single particle, direct transfer reactions, or by some other process. The results of this study and the current status of the analysis of this data will be presented.

*[1] P.G. Hansen and J.A. Tostevin, Annu. Rev. Nucl. Part. Sci.* ***53****, 219 (2003).*

*[2] C.A. Bertulani and P.G. Hansen, Phys. Rev. C* ***70****, 034609 (2004).*

*[3] R.C. Johnson and P.J.R. Soper, Phys. Rev. C* ***1****, 976 (1970).*

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Le café sera servi 10 minutes avant, en salle 125

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