Experiments with a Double Solenoid System


Abstract. The double solenoid system Radioactive Ion Beams in Brasil (RIBRAS) will be described. A recent experiment was performed using a pure $^6$He secondary beam on a CH$_2$ thick target. Results of this experiment will be presented.

RIBRAS [1] is presently the only experimental equipment in South America capable of producing secondary beams of rare isotopes. It consists of two superconducting solenoids, installed in one of the beam lines of the 8 MV Pelletron Tandem accelerator of the University of São Paulo. The exotic nuclei are produced in the collision between the primary beam of the Pelletron Accelerator and the primary target, placed just before the first solenoid. The secondary beam is produced by the in-flight technique and is usually contaminated by particles coming from scattering and reactions in the primary target such as $^7$Li, alpha and other light particles as protons, deuterons and tritons. Solenoids are good selectors due to their large acceptance and the double solenoid systems provides ways to improve the quality of the secondary beam by using a degrador in the mid way between the two solenoids. The main contamination of the secondary beam comes from $^7$Li$^{2+}$ particles coming from the primary beam. A degrador placed between the two solenoids is able to separate those particles from the $^6$He beam providing an additional charge exchange $^7$Li$^{2+}$-$^3$$^+$.$^+$ In addition, the differential energy loss in the degrador provides further selection of the light particles as protons, deuterons, tritons and alpha particles by the second solenoid. Here we present the results of the first experiment performed at RIBRAS using both solenoids. A pure $^6$He beam was produced and the reaction $^6$He+p was measured using a thick CH$_2$ target.