Coulomb suppression effects in the proton-proton elastic scattering extracted from the $^2H(p,pp)n$ reaction

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The $^2H(p,pp)n$ reaction has been widely studied both experimentally and theoretically [1, 2] and the quasi-free scattering is one of the possible break-up mechanisms.

In the framework of the Trojan Horse Method (THM) [3, 4, 5, 6] the quasi-free proton-proton elastic scattering has been studied at Laboratori Nazionali del Sud, INFN, Catania by using the $^2H(p,pp)n$ reaction. In the THM, that has been used to overcome the problem of low cross sections at energies far below the Coulomb barrier, one can assume that the extracted two-body cross section from a suitable three-body reaction is free from Coulomb suppression. In the present case the proton-proton elastic scattering has been extracted from $^2H(p,pp)n$ by using the THM and in particular the Plane wave impulse approximation approach (PWIA). In PWIA, the three-body cross section, is expressed as a product of the phase space factor, the momentum distribution of the spectator (neutron) inside the deuteron, and the two-body (p-p) cross section [7].

The energy trend of the free p-p cross section is very similar to that of p-n or n-n systems ($\approx 1/v$) except at low proton laboratory energies around 382 keV where the p-p system shows a deep minimum due to the interference between the nuclear and the Coulomb part of the interaction [8]. In order to investigate a region near this minimum, the $^2H(p,pp)n$ has been studied at a proton beam energy of 6 MeV and proton-proton coincidences from two position sensitive detectors, centered at symmetrical angles (20^o) with respect to the beam direction, have been acquired.

The obtained experimental spectra will be shown together with a Monte Carlo simulation by using the PWIA.

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