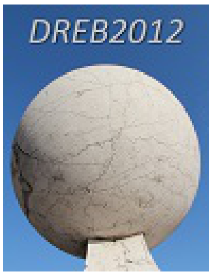

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Low-energy d+d fusion reactions via the Trojan Horse Method

Monday, 26 March 2012 17:00 (20 minutes)

The knowledge of 2H(d,p)3H and 2H(d,n)3He fusion cross section at low energies is of interest for pure and applied physics. Both reactions belong to the network of processes to fuel the first magnetic- and inertial-confinement fusion reactors in the range of kT= 1 to 30 keV. As for the Standard Big Bang Nucleosynthesis (SBBN), the region of interest ranges from 50 to 300 keV and experimental data at least up to 1 MeV are required for an accurate calculation of the reaction rate. Direct data are available below 200 keV, but not always in agreement within each other indicating large systematic errors in some of these data sets. The reaction rate has been calculated using theoretical curves fitting available low-energy data. Recently, we have carried out a new investigation of both 2H(d,p)3H and 2H(d,n)3He reactions throughout a d-d relative energy range from 1.5 MeV down to 2 keV, by means of the Trojan Horse Method (THM) applied to the quasi free 3He+d interaction at 18 MeV. As known, the THM [8-10] brings directly to the extraction of the low-energy bare nucleus cross section, free of Coulomb suppression and electron screening effects. Note that for a plasma plasma the value of the bare nucleus cross section must be known because screening in plasma is different from that in the laboratory. The measured S(E) factors, show deviations by more than 15% from previous estimates. The d+d results will be presented and discussed together with the basic features of the THM.

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