Measurements of the tensor analyzing power T_{20} in the $\mathrm{dd} \to {}^3\mathrm{Hp}$ and $\mathrm{dd} \to {}^3\mathrm{Hen}$ reactions at intermediate energies at 0°

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The data on the tensor analyzing power T_{20} in the $dd \to {}^3Hp$ and $dd \to {}^3Hen$ reactions at 140, 200 and 270 MeV of the deuteron kinetic energy and at a zero degree obtained at RIKEN Accelerator Research Facility using the spectrograph SMART [1] are presented.

In the framework of one-nucleon exchange (ONE) approximation tensor analyzing powers T_{20} of these reactions in collinear geometry are described by the D/S ratio of the 3-nucleon bound state or the deuteron wave functions, when ${}^3H({}^3He)$ is emitted in the forward or backward directions in the c.m., respectively [2]. In Fig.1 tensor analyzing power T_{20} in the $dd \to {}^3Hp$ reactions with the ${}^3H$ emission at 0° and 180° in the c.m. are shown by open triangles and squares, respectively, while the solid circles are the T_{20} in the $dd \to {}^3He(0^\circ)n$ reaction. The solid and dashed curves are obtained in the framework of ONE [2] at 0° and 180° of the ${}^3He$ emission angle in the c.m., respectively, using Urbana ${}^3He$ and Paris deuteron wave functions. The positive and negative sign of T_{20} for the forward and backward kinematics clearly demonstrates the sensitivity to the D/S waves ratios in the ${}^3H({}^3He)$ and deuteron, respectively.

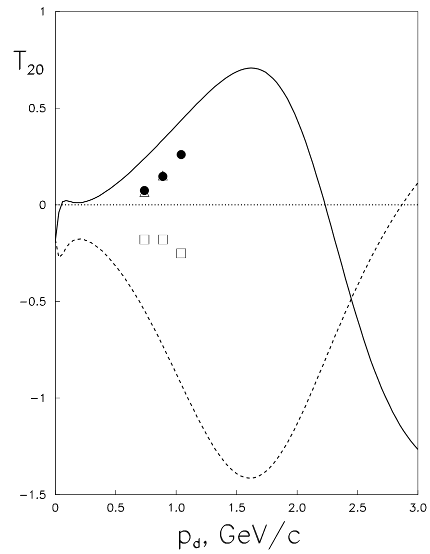

Figure 1: Tensor analyzing powers T_{20} in the $dd \to {}^3Hp$ and $dd \to {}^3Hen$ reactions in collinear geometry.

Although the general behaviour of T_{20} is consistent with the prediction of ONE approximation, absolute magnitude of T_{20} deviates dramatically from the calculations, especially, at the backward angles. Therefore one can conclude that the considering of mechanism beyond ONE is necessary for better description of the data.

References

[1] T.Ichihara et al., Nucl.Phys.**A569** (1994) 287c.

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