

Test of time-reversal invariance in antiproton-deuteron scattering

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The integrated cross section of double polarized pd-scattering with transverse polarization of the proton (P_y) and tensor polarization (P_{xz}) of the deuteron constitutes a null-test signal of the time-invariance violating P-parity conserving (TVPC) effects $\tilde{\sigma}$ [1]. Experimental search of this signal is planned at COSY at proton beam energy 135 MeV [2]. Theoretical study of the energy dependence of this signal for several type of phenomenological TVPC NN- interactions was done within the Glauber theory in [3] for the S-wave approximation and in [4] with the deuteron D-wave included. In both cases the Coulomb interaction was taken into account and its contribution to $\tilde{\sigma}$ is found to be rather small. However, the S-D interference is destructive and very important [4].

Evidently, the integrated cross section of the polarized (P_y) antiproton scattering off the tensor polarized (P_{xz}) deuteron also provides a null-test signal of the TVPC effects. One may assume that TVPC $\bar{N}N$ -interaction contains the same operator structure as the NN -interaction except the charge-exchange term $\bar{p}p \rightarrow \bar{n}n$. However, due to difference between strong NN- and antip N- scattering amplitudes the energy dependence of the null test signal in pd- and anti-pd- interaction has to be different. In the present work these properties will be discussed on the basis of the calculations within the spin-dependent Glauber model [5] using the $\bar{p}N$ -scattering amplitudes from Ref. [6].

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