Contribution ID: **44** Type: **not specified**

Test of T-invariance in Double Polarized Scattering of ^{3}He Nuclei on Deuterons

Thursday 7 September 2023 15:00 (30 minutes)

The total cross section of scattering of vector polarized protons on tensor polarized deuterons provides a null-test signal of violation of invariance with respect to time reversal (T) while conserving spatial (P) parity [1]. Very similar is the double polarized ^{3}He-d scattering considered here. The null-test signal cannot be simulated by the interaction in the initial and final states. We have calculated this observable for the ^{3}He-d scattering process up to an unknown constant of the T-odd P-even NN interaction at the energies of the 3He nuclear beam in the range of 100-1000 MeV/nucleon based on the Glauber theory. The necessary spin amplitudes of p^{3}He and n^{3}He elastic scattering are calculated in the S-wave approximation for the wave function of the 3He nucleus taking into account the spin dependence of the pN elastic scattering amplitudes [2] with the contribution of T-invariance violating, but P-parity conserving interactions between nucleons. All types of mechanisms –single, double and triple scatterings, are included for both T-even and T-odd amplitudes. When calculating the amplitude of elastic 3He-d scattering, the previously developed formalism for elastic pd scattering [1,2] is used, taking into account the S and D waves of the deuteron wave function, while the spin-dependent pN scattering amplitudes are replaced by the corresponding spin-dependent amplitudes of the 3He-N scattering. The results of the calculation of the differential cross section, vector analyzing power Ay and spin correlations of the p3He scattering process are in good agreement with the available experimental data [3,4] in the forward hemisphere at energies of 150-1000 MeV. The dependence of the null-test signal on the 3He-d collision energy for different types of T-odd P-even NN interaction [5] is presented.
The research was carried out at the expense of the grant of the Russian Science Foundation No. 23-22-00123, https://rscf.ru/project/23-22-00123 /.

List of references

1. Y.N. Uzikov, J. Haidenbauer, Phys. Rev. C 94, 035501 (2016).
2. M.N. Platonova, V.I. Kukulin, Phys. Rev. C 81, 014004 (2010).
3. D.K. Hasell et al. Phys. Rev. C 34, 236 (1986).
4. E.J. Brash et al., Phys. Rev. C 52, 807 (1995).
5. M. Simonius, Phys. Rev. Lett. 78, 4161 (1997).

Primary authors: PLATONOVA, Maria (Lomonosov Moscow State University, Skobeltsyn Institute of Nuclear Physics); TURSUNBAYEV, Nurbek (JINR, DLNP); UZIKOV, Yury (Joint Institute for Nuclear Researches)

Presenter: UZIKOV, Yury (Joint Institute for Nuclear Researches)

Session Classification: Plenary