Contribution ID: **142** Type: **Poster**

Field-theoretical treatment of the deuteron breakup in the reaction $e + d \to e' + p + n$ on $e'p$-coincidence

This research is the field-theoretical description of the deuteron breakup by fast electrons, being a prolongation of the studies carried out [1] at the Kharkiv Institute of Physics & Technology. As in our recent works [2,3], key features of the approach proposed embody gauge-independent calculations of the reaction amplitudes, as well as, a fresh look at the construction of the one-nucleon current operator and a new family of isovector meson exchange currents. The latter is acquired by starting from the Noether current and reformulating it in the clothed particle representation.

Following [4], we have focused on angular distributions and polarization of the knocked-out protons that are expressed through the structure functions W_i and $\vec{\Sigma}_i$ ($i = C, T, S, I$), respectively, taking into account the final state interaction (FSI). We emphasize the latter since this polarization takes zero values without FSI included. We use the deuteron wave function in the momentum space that has been calculated in the clothed particle representation [5], and the "distorted" wave functions of the np-pair obtained by solving the R-matrix equation with the so-called Kharkiv potential. Our calculations are essentially relativistic. We avoid any nonrelativistic reduction.

Special attention is paid to predicting observables at kinematics forbidden in the electron scattering on free nucleons (cf. [6]), viz., the region corresponding to proton emission into the backward hemisphere.
It is implied that our approach can be extended to the theory of the neutrino scattering off few-nucleon nuclei.

References

1. V. Kotlyar, Yu. Mel'nik and A. Schebeko, PEPAN **26** (1995) 192;
2. Y. Kostylenko and O. Shebeko, Few-Body Syst. **65** (2024) 55;
3. Y. Kostylenko, PhD thesis, NSC KIPT, Kharkiv, Ukraine (2024);
4. A. Yu. Korchin, Yu. P. Melnik and A. V. Schebeko, Few-Body Syst. **9** (1990) 211;
5. A. Shebeko and E. Dubovik, Few-Body Syst. **54** (2013) 1513;
6. Yu. P. Mel'nik and A.V. Shebeko, Phys. of At. Nucl. **58** (1995) 10;

Authors: ARSLANALIEV, Adam (National Science Center "Kharkiv Institute of Physics and Technology"); Dr SHEBEKO, Oleksandr (National Science Center "Kharkiv Institute of Physics and Technology"); KOSTYLENKO, Yan (National Science Center "Kharkiv Institute of Physics and Technology")

Presenter: KOSTYLENKO, Yan (National Science Center "Kharkiv Institute of Physics and Technology")

Session Classification: Poster session

Track Classification: Few-Body Systems