J.Golak[1], W.Glöckle[2], H.Kamada[3],
H.Witała[1], R.Skibiński[1]
[1] Jagiellonian University, Kraków
[2] Ruhr-Universität, Bochum
[3] Kyushu Institute of Technology

Besides the deuteron, polarized ^{3}He is used to extract information on the electromagnetic neutron form factors. In a recent paper [1] we have analyzed the experiment [2] on the process $^3\overrightarrow{\mathrm{He}}(\vec{e},e')$ with the aim to extract the magnetic neutron form factor, G_M^n, and obtained information on the electric neutron form factor, G_E^n, from the exclusive measurement [3] on the process $^3\overrightarrow{\mathrm{He}}(\vec{e},e'n)$. The problem of G_E^n has been further investigated in [4]. All details about our Faddeev formalism can be found in [1]. Many experimental data have been and will be taken at higher energy and momentum transfers and thus there is a clear need for a relativistic framework.

In this contribution we would like to show the first steps in this direction. We employ the idea of a Lorentz boosted two-nucleon potential [5] introduced in the context of equal time relativistic quantum mechanics. The dynamical input for the boosted potential is based on realistic nucleon-nucleon potentials. The resulting Lorentz boosted potential has been calculated in [6] and applied in relativistic Faddeev equations for the three-nucleon bound state. We will present first results of approximate relativistic calculations for electron induced breakup of ^{3}He with consistent relativistic deuteron and three-nucleon bound states, relativistic boosted T-matrices, the relativistic single nucleon current operator and relativistic kinematics in the intermediate as well as in the final states. We will show results both for the two- and three-body electro-disintegration of ^{3}He, for the unpolarized cross sections and the spin dependent helicity asymmetries. We hope that even at this stage our framework can be used to analyze data taken in regions not accessible by standard non-relativistic calculations. First attempts [7] based on even simpler dynamical input seem to be successful.

References

[1] J. Golak *et al.*, Phys. Rev. C**63**, 034006 (2001).
[2] W. Xu *et al.*, Phys. Rev. Lett. 85, 2900 (2000).
[3] J. Becker *et al.*, Eur. Phys. J. A**6**, 329 (1999).
[4] J. Golak *et al.*, Phys. Rev. C**65**, 044002 (2002).
[5] W. Glöckle *et al.*, Phys. Rev. C**33**, 709 (2986).
[6] H. Kamada *et al.*, Phys. Rev. C**66**, 044010 (2002).
[7] C.Carasco *et al.*, Phys. Lett. **B559**, 41 (2003).