where we considered, that in the extreme relativistic limit $Q^2 = 4E\,E'\sin^2\frac{\theta_e}{2}$ and $\nu_0 = 4E\,E'\cos^2\frac{\theta_e}{2}$. The term in the square brackets represent the usual Mott cross-section, with α being the fine-structure constant. This cross-section can now be used to determine the experimentally interesting asymmetry for the pd breakup. Inserting Eq. (2.14) into Eq. (2.4) one gets:

$$A_{pd} = \frac{\nu_{T'}R_{T'} + \nu_{TL'}R_{TL'}}{\nu_L R_L + \nu_T R_T + \nu_{TT}R_{TT} + \nu_{TL}R_{TL}}\,. \tag{2.15}$$

If the quantization axis of the $^3\vec{He}$ is not pointing in the direction of the $\vec{q}$ but in the direction given by the angles (θ^*, ϕ^*), then the ^{3}He state can be written as:

$$|\Psi_{^3He}(m, \theta^*, \phi^*)\rangle = \sum_{m'} D^{(1/2)}_{m'm}(\phi^*, \theta^*, 0)|\Psi_{^3He}(m')\rangle\,,$$

where $|\Psi_{^3He}(m')\rangle$ is quantized in direction of $\vec{q}$, and $D^{(1/2)}_{m'm}(\phi^*, \theta^*, 0)$ are the spherical rotations [38]. Considering this in the calculation of the matrix elements for the nuclear transitional currents, one obtains an expilicit (θ^*, ϕ^*) dependence of the following nuclear structure functions [39]:

$$\begin{aligned} R^{TL}_{fi} &= \tilde{R}^{TL}_{fi}\sin\theta^*\sin\phi^*\,, \\ R^{T'}_{fi} &= \tilde{R}^{T'}_{fi}\cos\theta^*\,, \\ R^{TL'}_{fi} &= \tilde{R}^{TL'}_{fi}\sin\theta^*\cos\phi^*\,, \end{aligned} \tag{2.16}$$

where $\tilde{R}^{TL}_{fi}$, $\tilde{R}^{T'}_{fi}$ and $\tilde{R}^{TL'}_{fi}$ reprents the reduced nuclear structure functions, which no longer depend on the target orientation. Independent of the (θ^*, ϕ^*) remain the nuclear structure functions R^T_{fi}, R^L_{fi} and R^{TT}_{fi}. Considering Eqs. 2.16 in Eq. 2.15, the asymemtry for the (pd) breakup can be expressed as:

$$A_{pd}(\theta^*, \phi^*) = \frac{\nu_{T'}\tilde{R}^{T'}_{fi}\cos\theta^* + \nu_{TL'}\tilde{R}^{TL'}_{fi}\sin\theta^*\cos\phi^*}{\nu_L R_L + \nu_T R_T + \nu_{TT}R_{TT} + \nu_{TL}\tilde{R}^{TL}_{fi}\sin\theta^*\sin\phi^*}\,. \tag{2.17}$$

An analogous approach can be utilized to obtain the asymmetry for the three-body breakup of ^{3}He, where initial nucleus decays into two protons and a neutron. This time two reaction products remain undetected. Consequently, an additional integration over the direction of the relative momentum of the two undetected nucleons $\hat{p}_{pn}$ is required in the expression for the asymmetry [26]:

$$A_{ppn} = \frac{\int d\hat{p}_{pn}\;(\nu_{T'}R_{T'} + \nu_{TL'}R_{TL'})}{\int d\hat{p}_{pn}\;(\nu_L R_L + \nu_T R_T + \nu_{TT}R_{TT} + \nu_{TL}R_{TL})}\,. \tag{2.18}$$

In order to predict the behaviour of the asymmetries A_{pd} and A_{ppn}, the response functions, given with Eqs. (2.13) must be know. Hence, the transitional nuclear currents J_μ must be determined, which describe transition of the hadronic system from the initial state (^{3}He) to the final hadronic states (pd, ppn), after an interaction with a virtual photon. There are various approaches for obtaining these currents [24, 25, 26]. Predictions made for E05-102 experiment are based on the Faddeev type calculations [26]. Calculations were performed for both longitudinal and transverse spin oriatations, providing us with predictions for both A_x and A_z asymmetrires.