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Thesis Title	*Experimental Data Analysis on the Proton Electro-Excitation in the kinematical region of the Δ-resonance with W=1232 MeV and Q^2=1 $(GeV/c)^2$*
Supervisor	E. Styliaris, Associate Professor
Summary	In proton elecro-excitation experiments through the process $p(e,e'p)\pi^0$, the cross sections are calculated by the experimental technique "Out Of Plane Spectrometry" (OOPS) and they are expressed by linear combinations of the transverse and longitudinal Response Functions (R_L, R_T) as well as their interferences (R_{LT}, R_{TT}). Those Response Functions are connected through the CGLN (Chew-Goldberger-Low-Nambu) notation with the basis of the electromagnetic amplitudes (E_i, M_i, C_i). Ultimate goal of this analysis is to define the number and kind of the amplitudes which dominate the energy region of the experimental data. The current work focuses on the analysis of experimental data collected in Hall A of the Jefferson Lab and describing the proton electro-excitation at the region of the Δ resonance, and more specifically, at the kinematical variables of W=1232 MeV and Q^2=1 $(GeV/c)^2$. Having explained the importance of the kinematic terms and the experimental measurements, the theoretical analysis on how to produce the cross sections from a multipole database is analytically described. The complexity of the CGLN formalism that connects the cross sections to the multipoles, does not permit a unique inversion of the problem, thus making the theoretical determination of the important multipoles ambiguous. In order to solve this irreversible problem, the model AMIAS (Athens Model Independent Analysis Scheme) is introduced to the analysis. AMIAS is based on Monte Carlo techniques and offers the ability to calculate the multipoles from the experimental data only, without inserting any model error. Firstly, the understanding of this reversed procedure can be achieved with simple examples, where the importance of the correlations between the free parameters of the problem is conducted. Furthermore, the fundamental results of the multipole analysis are defined and compared to the divergence of the hadron's shape from the sphericity. Last but not least, the experimental data from JLab are compared to the 1σ and 2σ error bands, which are produced by taking under consideration the probability distribution functions (PDF) of the AMIAS multipole results.
Key words	
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