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Dipole Dynamical Polarizabilities from proton Real Compton Scattering data

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I will discuss the results of a recent work on the extraction of the dipole dynamic polarizabilities (DDPs) from proton Real Compton Scattering (RCS) data below pion production threshold. The dynamical polarizabilities are energy dependent functions which parametrize the response of the internal degrees of freedom of the proton to an external, real-photon field of arbitrary energy. As such, they contain enriched information with respect to the static polarizabilities defined in the limit of zero-frequency photon field. I will introduce the theoretical framework, which combines dispersion relations, the low-energy expansion and multipole decomposition of the scattering amplitude, focusing the attention on the electric and magnetic DDPs[1]. Furthermore, I will discuss the statistical analysis, based on the parametric bootstrap technique. These statistical tools have been applied for the first time to analyze RCS data, and have been crucial to overcome problems inherent to the analysis of the available data set. I will present the main advantages of this fitting method, including preliminary results about the statistical interpretation of the $\chi 2$ function when also systematical errors are taken into account. Finally, I will show new results for the extraction of the static polarizabilities αE1 and βM1, using subtracted dispersion relations and the bootstrap technique.

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