

Dispersion relations in real and virtual Compton Scattering

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A unified presentation is given on the use of dispersion relations in the real and virtual Compton scattering processes off the nucleon. The way in which dispersion relations for Compton scattering amplitudes establish connections between low energy nucleon structure quantities, such as polarizabilities, and the nucleon excitation spectrum is discussed. Various types of dispersion relation formalisms have been investigated in order to explore the possibility of extracting information about the polarizabilities from RCS data with a minimum of model dependence. First, we discuss the predictions of the RCS polarizabilities within unsubtracted dispersion integrals, using both fixed- t and interior dispersion relations. Second, we introduce subtracted dispersion relations whose subtraction constants are linear combinations of the polarizabilities to be determined directly by a fit to Compton data. Such an investigation is presented within both fixed- t and interior subtracted dispersion relations which provide a complementary description of the RCS process and, at the same time, an important consistency check in the analysis of the RCS polarizabilities. The dispersion relation formalism is then extended to virtual Compton scattering (VCS), and the information on generalized nucleon polarizabilities extracted from recent VCS experiments is described.