

Institutsseminar Kern- und Hadronenphysik

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Pion polarizabilities

The electric α_π and magnetic β_π charged pion polarizabilities characterize the induced dipole moments of the pion during $\gamma\pi$ Compton scattering. Pion polarizabilities affect the shape of the $\gamma\pi$ Compton scattering angular distribution. By crossing symmetry, the $\gamma\pi \rightarrow \gamma\pi$ amplitudes are related to the $\gamma\gamma \rightarrow \pi\pi$ amplitudes. Dispersion relations (DR) describe how charged pion polarizabilities contribute to both $\gamma\gamma \rightarrow \pi^+\pi^-$ and $\gamma\gamma \rightarrow \pi^0\pi^0$ reactions. A stringent test of chiral perturbation theory (ChPT) is possible by comparing the experimental polarizabilities with ChPT predictions. The combination $(\alpha_\pi - \beta_\pi)$ has been measured by: (1) radiative pion Primakoff scattering $\pi Z \rightarrow \pi Z \gamma$ at CERN COMPASS, (2) two-photon pion pair production $\gamma\gamma \rightarrow \pi\pi$ at SLAC PEP Mark-II, (3) radiative pion photoproduction $\gamma p \rightarrow \gamma \pi n$ at Mainz MAMI. COMPASS and Mark-II (but not Mainz) polarizabilities are in good agreement with ChPT predictions; and by DRs, with DESY Crystal Ball $\gamma\gamma \rightarrow \pi^0\pi^0$ data. A pion polarizability status report is presented, following the review by S. Scherer and M. Moinester for IJMPA.