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Pion Polarizability at CERN COMPASS

The electric $\alpha\pi$ and magnetic $\beta\pi$ charged pion Compton polarizabilities provide stringent tests of Chiral Perturbation Theory. The combination $(\alpha\pi-\beta\pi)$ was measured at CERN COMPASS via radiative pion Primakoff scattering (Bremsstrahlung of 190 GeV/c π -s) in the nuclear Coulomb field: $\pi + Z \rightarrow \pi + \gamma + Z$. This reaction is identified experimentally by virtue of the very small momentum transfer to the target nucleus; and is equivalent to $\gamma + \pi \rightarrow \gamma + \pi$ Compton scattering for laboratory γ 's of order 1 GeV/c incident on a target pion at rest. COMPASS data analysis (assuming $\alpha\pi+\beta\pi=0$ based on theory) gives a preliminary value of $\alpha\pi = -\beta\pi = (1.9 \pm 0.7_{\text{stat.}} \pm 0.8_{\text{syst.}}) \times 10^{-4} \text{ fm}^3$.

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