

# Testing Predictions of the Chiral Anomaly in Primakoff Reactions at COMPASS

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The chiral anomaly is a fundamental property of quantum chromodynamics (QCD). It governs e.g. the decay of the neutral pion  $\pi^0 \rightarrow \gamma\gamma$ . In general, it relates the coupling of an odd number of Goldstone bosons to vector bosons. In case of three pions, the magnitude of the resulting coupling is  $F_{3\pi}$  and the value is precisely predicted by chiral perturbation theory. It can experimentally be measured in  $\pi^-\gamma \rightarrow \pi^-\pi^0$  scattering.

Here, we report on a precision experiment on  $F_{3\pi}$  using the COMPASS experiment at CERN where pion-photon scattering is mediated via the Primakoff effect using heavy nuclei as target. We exploit the interference of the production of the  $\pi^-\pi^0$  final state via the chiral anomaly with the photo-production of the  $\rho(770)$  resonance over a wide mass range ( $M_{\pi^-\pi^0} < 1\text{GeV}/c^2$ ). This is in contrast to previous measurements restricting themselves to the threshold region only. Our analysis allows to simultaneously extract the radiative width of the  $\rho(770)$  resonance and gives a stronger handle on  $F_{3\pi}$  in a unified approach thereby minimizing systematic effects rarely addressed previously.

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