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Testing Chiral Perturbation Theory in Soft Hadron-Photon Reactions at COMPASS and AMBER

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In meson-photon collisions resonances may be formed, such as the $\rho(770)$ or $a_2(1320)$ for pions, and $K^*(892)$ when kaons collide with photons. For low collision energies, chiral dynamics governs the process, eventually leading to final states with additional mesons that do not come from resanace decays. The production of an additional pi0 is determined by the chiral anomaly, and its value is an important test for chiral perturbation theory.

At COMPASS, such meson-photon collisions can be realized in Primakoff processes, initiated by the high-energy hadron beam from the CERN Super Proton Synchrotron on nuclear targets. The energy is sufficiently high such that the full spectrum including the formed resonances and their interference with the non-resonant contributions is visible. This allows for a determination of the chiral anomaly and radiatve widths of resonances with a new level of precision. The investigations are foreseen to be continued with the new possibilities of AMBER, the successor experiment of COMPASS at the same beamline of the SPS.

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