

Photoproduction of Pseudoscalar Mesons

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Experiments that study the photoproduction of the pseudoscalar mesons — pions, etas and kaons, potentially can increase our knowledge of the properties of the baryon and hyperon resonances. The availability of modern experimental facilities with pseudo-monochromatic photon beams, such as GRAAL, SPring-8, Bonn, Mainz and Jefferson Lab at high energies, together with LEGS, Max-Lab and SAL closer to the threshold region, are beginning to produce high-quality results, with small statistical uncertainties and well understood systematic uncertainties, in the determination of differential and integrated cross sections together with polarization and asymmetry measurements. These data can be compared with the predictions of QCD-based models, such as lattice-gauge calculations of baryon properties, and Chiral Perturbation Theory approach to threshold photoproduction, and are essential to the performance of Partial-Wave Analyses (PWA). These PWA studies are less model dependent than in the past. They use coupled-channels calculations that incorporate unitarity dynamically and also combine results from hadronic reaction channels together with electromagnetic processes. This approach is necessary to extract resonance properties and may lead to the discovery of the (up to now) “missing resonances”, predicted by a number of different QCD-inspired calculations. Recent experimental and phenomenological results for single and double pseudoscalar meson photoproduction channels will be discussed.