Photoproduction of neutral pion pairs off protons

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Excited baryons have been studied in a variety of meson–nucleon scattering experiments. However, in comparison to recent quark–model calculations many questions remain to be answered. Most of the models predict much more states at high excitation energies than have been observed so far and it is still impossible to decide which type of the proposed quark-quark–interactions is realized in strong QCD.
Photoproduction of mesons and meson pairs allows to study individual resonances and transitions between different states by choosing selective decay channels.
The Crystal–Barrel–Experiment at the Electron Stretcher and Accelerator (ELSA) in Bonn/Germany focuses on photoinduced reactions with neutral mesons in the final state. By means of bremsstrahlung tagging quasi-monochromatic photons are produced up to energies of 2.9 GeV . The Crystal–Barrel–calorimeter consists of 1380 CsI crystals which cover 98% of the full solid angle in the laboratory system. The large solid angle coverage together with a good energy and angular resolution allows to reconstruct multi–photon final states with high efficiency.
In 2001 data on the reaction $\gamma p \rightarrow p\pi^0\pi^0$ have been taken up to center of mass energies of 2.6 GeV. This reaction provides clean access to successive decays of high mass states through different intermediate resonances because many non–resonant production amplitudes are strongly suppressed compared to reactions where charged mesons are involved. In the talk, the experimental setup at ELSA as well as the data analysis will be presented and physical results will be discussed.