

# New experimental results for the photoproduction of mesons off nuclei

Bernd Krusche

Department of physics and astronomy  
University of Basel  
Ch-4056 Basel, Switzerland

During the last few years a diverse experimental program for the study of the photoproduction of mesons off nuclei has been carried out at the Mainz MAMI and Bonn ELSA electron accelerators with the TAPS, Crystal Barrel, and Crystal Ball calorimeters. The program centers around the study of the in-medium properties of hadrons, the meson-nucleus interactions, and the excited states of the neutron with photon induced reactions. The experiments cover the following major topics:

- The direct search for in-medium modifications of vector mesons via the investigation of the resonance shape of the  $\omega$  meson from its  $\pi^0\gamma$  decay in nuclear matter.
- The investigation of resonance contributions to  $\eta$ ,  $\pi$ ,  $2\pi$  meson production reactions from nuclei aiming at the in-medium properties of excited nucleon states, which are closely connected to the predicted in-medium modifications of vector mesons.
- The investigation of the pion-pion invariant mass distributions for  $2\pi^0$  and  $\pi^0\pi^\pm$  photoproduction from nuclei as a tool to study the in-medium behavior of the  $\sigma'$  meson.
- The search for  $\eta$ -nucleus bound states (so-called  $\eta$  mesic nuclei), which would be the ideal testing ground for the investigation of the  $\eta$  nucleus interaction.
- The investigation of  $\eta$ ,  $2\pi^0$ , and  $\eta'$  photoproduction off the deuteron in view of the electromagnetic excitation of nucleon resonances on the neutron.

The talk will summarize the progress for the different topics and concentrate on the most recent results from second generation experiments.

E-mail: [Bernd.Krusche@unibas.ch](mailto:Bernd.Krusche@unibas.ch)