

Overview of hadron photoproduction experiments in SPring-8 LEPS2 project

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At SPring-8 LEPS2 beamline, a linearly polarized photon beam is available in the tagged energy range of 1.3–2.4 GeV. The first stage of LEPS2 project was carried out using an experimental setup with a large acceptance calorimeter, called BGOegg, which had the world's best resolution in the energy range around 1 GeV. So far, we have intensively studied for the origin of hadron mass via η' meson photoproduction inside a nucleus, where the spontaneous breaking of chiral symmetry is expected to be partially restored. A summary of our analyses will be shown including a direct spectral measurement of in-medium η' mass and a search for η' mesic nuclei. In addition, an on-going experiment with an upgraded setup will be discussed as a second-stage study for the in-medium η' mass.

Other physics subjects with the use of the BGOegg calorimeter will be also overviewed, containing the investigation of high mass and high spin baryon resonances via photoproduction of π^0 , η , ω , and η' mesons from a liquid hydrogen target. Recently, we have succeeded in observing the photoproduction of a $f_0(980)$ meson decaying into $\pi^0\pi^0$, for the first time. The measured differential cross sections and photon beam asymmetries provide useful information about the $f_0(980)$ structure, which may be an exotic non- $q\bar{q}$ state.

In parallel to the second-stage experiment with the BGOegg calorimeter, we now operate a different experimental setup with a 4π charged-particle spectrometer installed inside a large volume solenoidal magnet. Recent status and future prospect will be given for a variety of subjects in the LEPS2 project.

Collaboration

SPring-8 LEPS2

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