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The high-energy photoproduction of light-quark pseudoscalar and scalar mesons at GlueX

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The high-energy photoproduction of light-quark pseudoscalar and scalar mesons is an effective tool for understanding the properties of strong interaction in the nonperturbative regime. It has been investigated theoretically using Regge-cut phenomenology with massive quasi-particle exchange in high-energy regime, and the linearly polarized photon beam asymmetry Σ can provide insight into dominant production mechanism. In the low-energy region, it can provide constraints on "background" to baryon resonance extraction. With almost 50-year history, intensive experiments on meson photoproduction are growing vigorously at several international laboratories, such as JLab, ELSA, and MAMI. Recently the beam asymmetry Σ in high-energy π^0/η photoproduction has been measured at GlueX, which is the first measurement both from the GlueX experiment and the 12-GeV-upgraded JLab. The highest precision measurement of the π^0 asymmetry and the first measurement of η beam asymmetry at the energy above $E_\gamma = 3$ GeV are presented. A broad meson photoproduction project, including scalar meson $a_0(980)/f_0(980)$, is under way at GlueX. In this talk, we will report the beam asymmetry results for π^0/η photoproduction at GlueX, as well as preliminary results for scalar meson photoproduction in the $\pi^0\pi^0$ and $\pi^0\eta$ channels.

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