

Photoproduction of the $f_1(1285)$ meson

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Collaboration

CLAS

Abstract content

The $f_1(1285)$ meson with mass 1281.0 ± 0.8 MeV/ c^2 and width 18.4 ± 1.4 MeV (FWHM) was measured for the first time in photoproduction from a proton target using CLAS at Jefferson Lab. Differential cross sections were obtained via the $\eta\pi^+\pi^-$, $K^+\bar{K}^0\pi^-$, and $K^-K^0\pi^+$ decay channels from threshold up to a center-of-mass energy of 2.8 GeV and are compared to model predictions. An amplitude analysis of the $\eta\pi^+\pi^-$ final-state Dalitz distribution is consistent with identification as the axial-vector $J^P = 1^+$ $f_1(1285)$, rather than the pseudoscalar 0^- $\eta(1295)$. The production mechanism is most consistent with s -channel decay of a high-mass N^* state, and not with t -channel meson exchange. Decays of the $f_1(1285)$ to $\eta\pi\pi$ are clearly dominated the intermediate states $a_0^\pm(980)\pi^\mp$. The branching ratios $\Gamma(a_0\pi(n\bar{K}K))/\Gamma(\eta\pi\pi(all))$, $\Gamma(K\bar{K}\pi)/\Gamma(\eta\pi\pi)$ and $\Gamma(\gamma\rho^0)/\Gamma(\eta\pi\pi)$ were obtained and will be compared to world averages.

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