Old Dominion University
Department of Physics

Dissertation Defense
Tuesday, May 21 2024

" Measurement of the Photoproduction Cross-Section of $f_1(1285)$ in the exclusive reactions $\gamma p \rightarrow p`K^{\mp}K_s\pi^{\pm}$ at $7.5 < E_\gamma < 11.5$ GeV with GlueX at Jefferson Lab"

Tyler Viducic

Location: ECSB 1201 "CAVE Auditorium"
Topic: Tyler Viducic's Thesis Defense
Time: 2:00 PM

Join Zoom Meeting
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Abstract:
The $f_1(1285)$ meson is commonly understood to belong to the axial-vector nonet as the low-mass isoscalar partner to the $f_1(1420)$ but has been suggested as a candidate for a KK* + c.c molecule. A nearly mass-degenerate 0^{-+} state has been observed in πp scattering that calls into question the established branching ratios of the $f_1(1285)$ decays. Recently, the differential cross-section for the photoproduction of $f_1(1285)$ was measured by the CLAS experiment and the results disagreed with theoretical predictions. Additionally, the CLAS experiment did not observe a mass-degenerate 0^{-+} state. We present the results of the first photoproduction cross-section measurement $\frac{d\sigma}{dt}$ of $f_1(1285)$ at $7.5 < E_\gamma < 11.5$ GeV from the GlueX experiment at Thomas Jefferson National Accelerator Facility in the reactions $\gamma p \rightarrow p`K^-K_s\pi^+$ and $\gamma p \rightarrow p`K^+K_s\pi^-$. We find that the production mechanism of $f_1(1285)$ is consistent with t-channel exchange. We also observe a difference in the differential cross-section of $f_1(1285)$ as a function of -t as measured in the charge conjugated $K^{\mp}K_s\pi^{\pm}$ decay modes that we hypothesize to be due to baryonic N* interference. The observed distributions of $M(KK)$ and $M(K\pi)$ are consistent with both a $q\bar{q}$ state and predictions for a KK* + c.c molecule molecular state. Additionally, we find that the cross-section at low $M(KK\pi)$ is dominated by the 1^{++} state.

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All interested persons are cordially invited to attend.