A search for the decay $\eta' \rightarrow \pi^+\pi^-\pi^0$ in CLAS data

MICHAEL ROSENMAN, MATT BELLIS, CURTIS MEYER, Carnegie Mellon University,
CLAS COLLABORATION — The primary decay modes for the $\eta'$ are $\pi^+\pi^-\eta$ and $\rho\gamma$, with respective branching ratios of 44.5% and 29.4%. The g11 dataset from Jefferson Lab and the CLAS detector contains about 500,000 events of the type $\gamma p \rightarrow p\eta'$ where the $\eta'$ is reconstructed from the former decay mode. Access to relatively large statistics motivated the search for previously unseen decay modes. With the excellent charged track identification that CLAS possess, a search was made for the decay $\eta' \rightarrow \pi^+\pi^-\pi^0$. This decay is listed in the PDG with only an upper limit of a 5% branching ratio at CL=90%. We search for this decay by measuring all charged tracks in the final state and reconstructing the neutral pion. We see no evidence for this decay and present the results of a careful study which shows that $\eta'$ peaks in this channel are more likely bleed-through from misidentified $\pi^+\pi^-\gamma$ decays.

Michael Rosenman
Carnegie Mellon University

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