

The Search for Exotic Mesons in the Three Pion Reaction Channel with CLAS12

Robert Wishart¹

¹University of Glasgow, Scotland

The constituent quark model describes mesons as a quark-antiquark pair. However, QCD which describes the strong force governing the interaction, does not forbid the existence of states outside this simple picture – so called exotic states. A goal of hadron spectroscopy is to investigate whether such exotic states exist, and by doing so, achieve a greater understanding of QCD. One particular configuration of an exotic state is a so-called hybrid which contains a constituent gluon alongside the quark-antiquark. The photoproduction of a three pion final state from a proton target may be used to search for hybrid states as the final state angular distributions can contain contributions only possible for intermediate hybrids states with quantum numbers not possible from a quark-antiquark pair alone. Previous results on this final state have been published on experimental data acquired at CLAS and COMPASS, the latter of which is showing strong evidence for the hybrid state.

Data was taken using the upgraded CEBAF Large Acceptance Spectrometer (CLAS12) at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) and analysed with the aim of isolating the three pion final state. This talk will discuss the aims and experimental procedures focusing on the experimental data taken with CLAS12 and the methods used in the analysis of this data.