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## Towards the Discovery of First Strange Hexaquark with CLAS12

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Quantum Chromo Dynamics (QCD) is our current best description of interactions between quarks and gluons and it not only predicts the existence of the well understood meson (two-quark) and baryon (three-quark) states it also predicts exotic Tetra-, Penta- and Hexaquarks.

Experiments taking place at Thomas Jefferson Lab in Virginia, USA using the upgraded CLAS12 detector system allows a detailed investigation of exotic hadron systems. In our experiment electrons accelerated to an energy of 10.6GeV, scatter off either a liquid hydrogen or deuterium target. Various interesting effects can be explored in these reactions, including production of exotic hadrons, such as hybrids, pentaquarks or hexaquarks the latter being the subject of my research.

In my poster I will present the analysis of data recently collected at CLAS12, which provides the first search for a  $ds$  hexaquark, a particle with quark content  $uuudds$  or  $uuddds$  and quantum numbers  $J^p=3^+$ . Preliminary results on most promising decay channels, e.g.  $ed \rightarrow e'K+ds \rightarrow e'K+\Lambda n$  and  $ed \rightarrow e'K+ds \rightarrow e'K+dK^-$  will be shown. To enhance analysis sensitivity to these rare channels an improved PID (Particle Identification) method was developed. All experimental methods were verified utilizing more conventional reactions with similar final states, in particular  $ep \rightarrow e'K+\Lambda$ ,  $ep \rightarrow e'\rho^0 p$  and  $ep \rightarrow e'\omega p$ . These reactions on proton target were used as benchmarks to tune analysis techniques applied for the experiment's with deuterons. First results on  $ds$  searches will be confronted with analysis of empirical and simulated data of the most prominent background channels.

A profound theoretical study utilizing Monte Carlo calculations to simulate different decay branches acquiring the branching ratios and partial decay widths was also carried out to clarify the reaction dynamics for the  $ds$  hexaquark. The results of these calculations will be discussed as well.

**Presenter:** CLASH, Geraint

**Session Classification:** Poster Session