

# Partial Wave Analysis of Resonances in $K^+K^-$ and $KK^*$ with CLAS12

Monday, 29 June 2026 15:25 (20 minutes)

There are many states predicted by quantum chromodynamics (QCD) that haven't been observed experimentally. Furthermore, QCD predicts mesons that cannot exist according to the naive quark model, known as exotic mesons, which include glueballs, hybrid mesons, tetraquarks and meson molecules. The identification and study of these new forms of matter are of great importance to better understand the theory of the strong force. This talk concerns the electroproduction of meson resonances off the proton, which subsequently decay into kaon pairs, to better address the decay of flavour-blind, gluonic objects such as glueballs and regular hybrids, which are expected to couple strongly to this channel. Due to the vast complexity of the mesonic spectrum, simple bump hunting is insufficient to distinguish between the many broad and overlapping resonances produced in this channel, so moments analysis and partial wave analysis are employed to disentangle these resonances and determine their properties. This talk will present results from the partial wave analysis of the  $K^+K^-$  final state performed in collaboration with the JPAC theory group and based on data collected with the CLAS12 detector at Jefferson Laboratory. Several well-known resonances, such as  $\phi(1020)$ ,  $a_0^2(1320)$  and  $f'_2(1525)$ , are identified, and spins, masses and widths are obtained. To extract these resonances cleanly, a new analysis technique has been developed, which involves improved particle and event identification, longitudinal phase space plots to remove baryon resonance contamination and the application of an MCMC-based algorithm for the fitting procedure. Additionally, preliminary results will also be shown for the partial wave analysis of the  $KK^*$  final state, with the intention to expand the search for missing and exotic states.

## Collaboration

**Primary author:** VELASQUEZ, Charlie (University of York)

**Presenter:** VELASQUEZ, Charlie (University of York)

**Session Classification:** Parallel session B6

**Track Classification:** Light mesons (production, spectroscopy, decays)