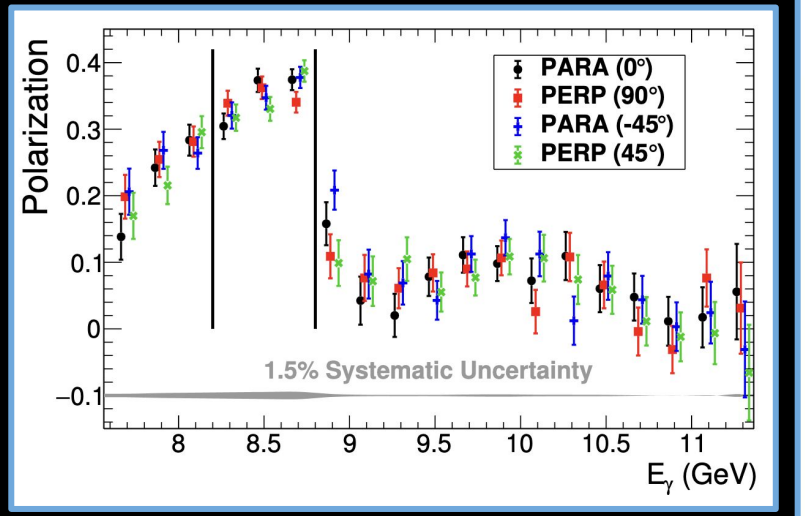
Hall-D Highlights

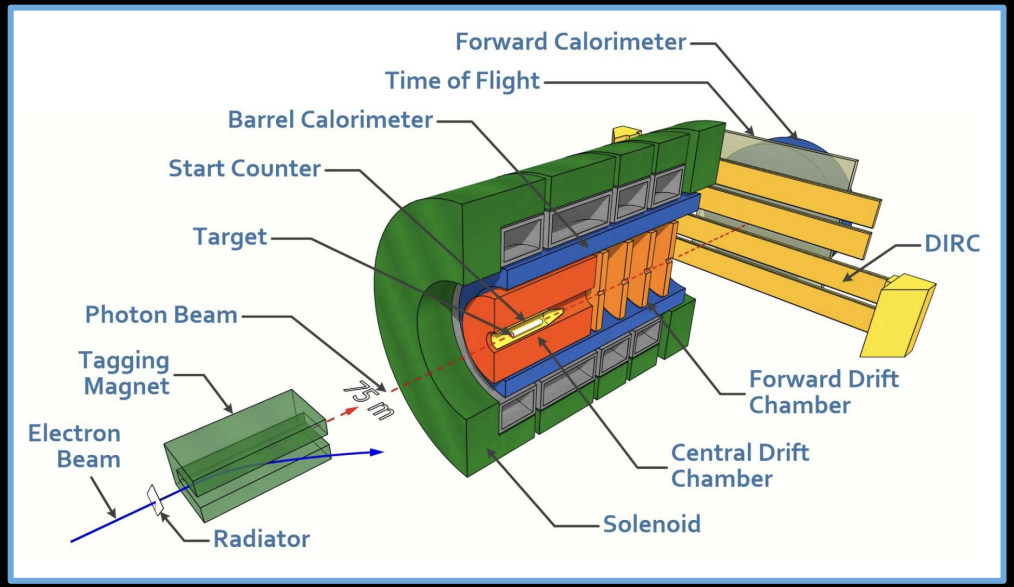
Edmundo S. Barriga

On behalf of the GlueX Collaboration

GlueX Detector

- Linearly polarized photon beam
- Almost complete angular coverage

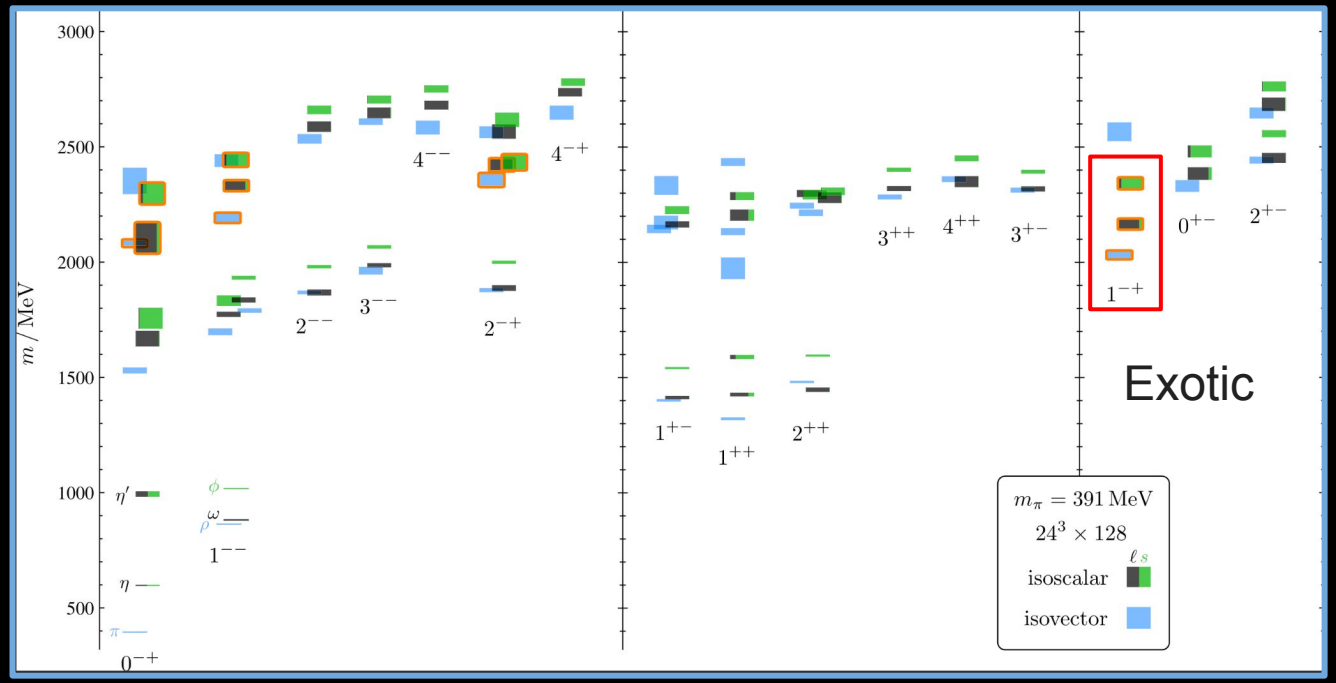




GlueX Experiment

- GlueX's goal is to expand the understanding of mesons and search for hybrid mesons

PRD 88, 094505 (2013)

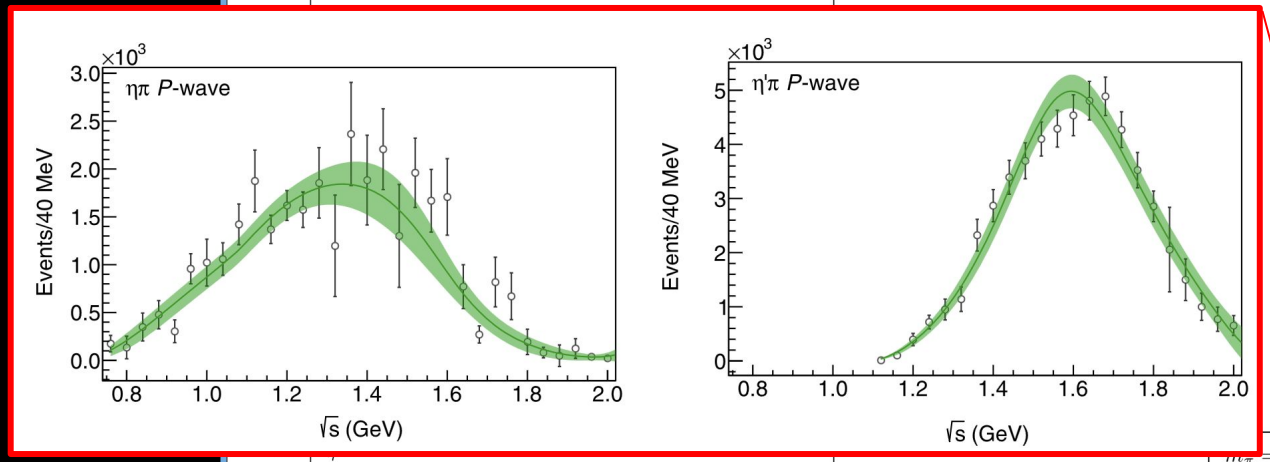


GlueX Experiment

- GlueX's goal is to expand the understanding of mesons and search for hybrid mesons

PRD 88, 094505 (2013)

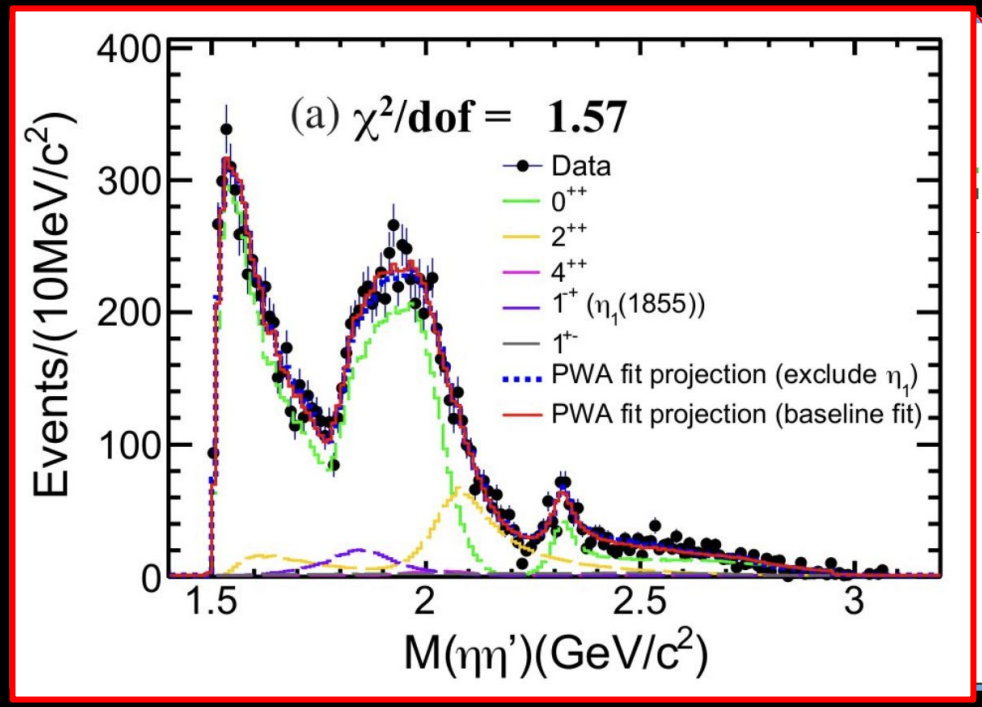
PLB 740 303-311 (2015)



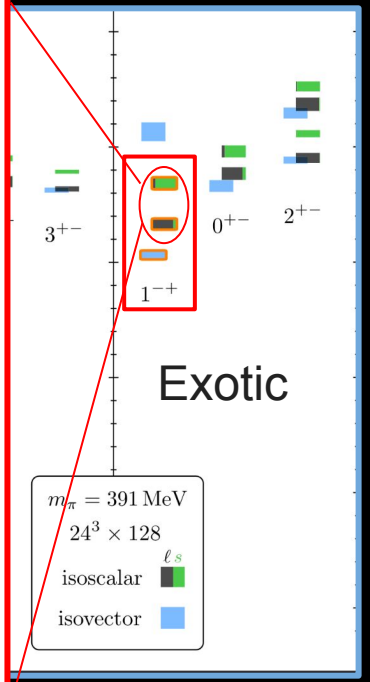
GlueX Experiment

- GlueX's goal is to expand the understanding of mesons and search for hybrid mesons

PRD 105, 072002 (2022)

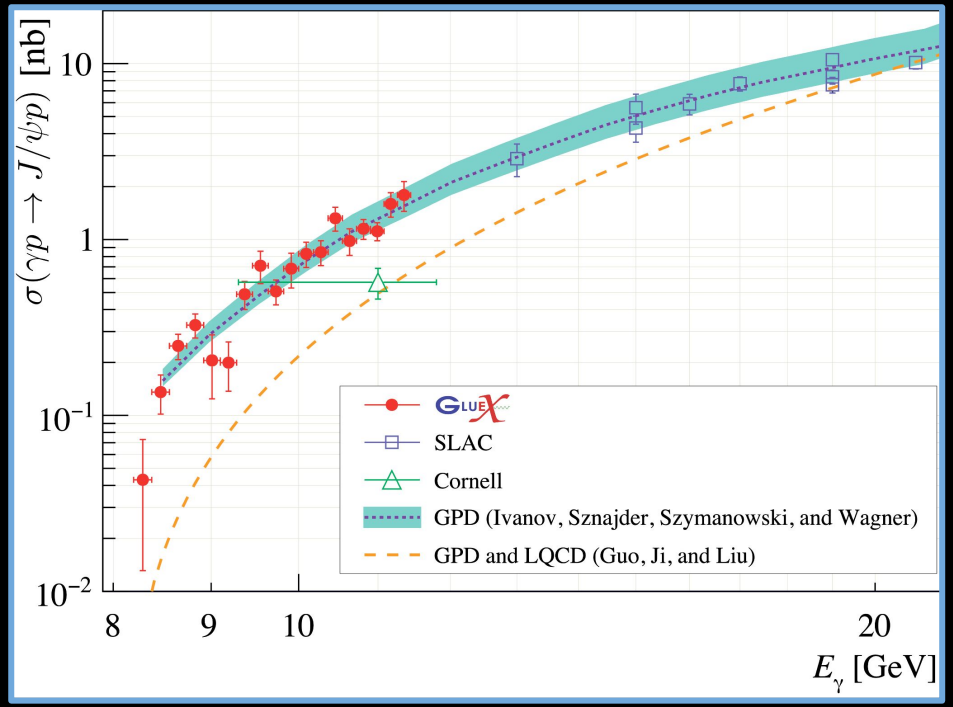


PRD 88, 094505 (2013)



Recent GlueX Results: J/ψ Cross-Section

- These measurements can aid understanding the gluon Generalized Parton Distribution (GPD) of the proton, the mass radius of the proton, among others.
- Possible structures in the total and differential cross sections provide evidence for contributions beyond gluon exchange

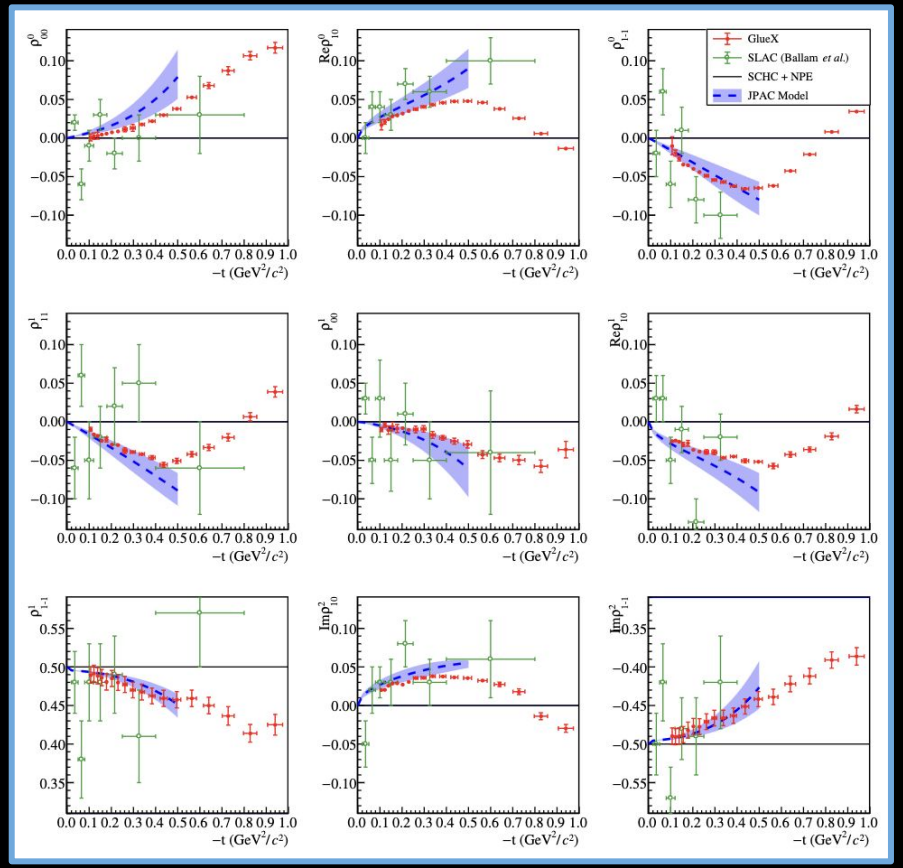


PhysRevC 108 (2023) 2, 025201

Recent GlueX Results: ϱ SDMEs

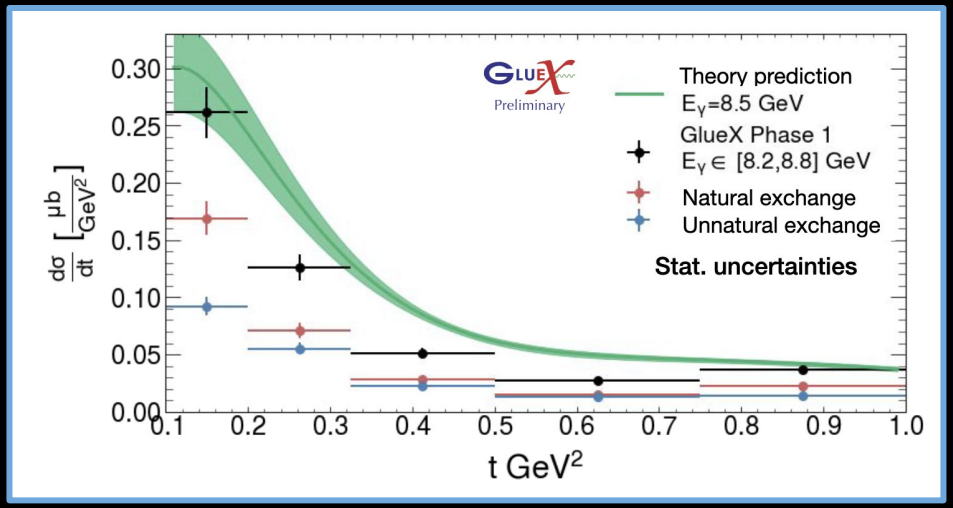
PhysRevC 108 (2023) 055204

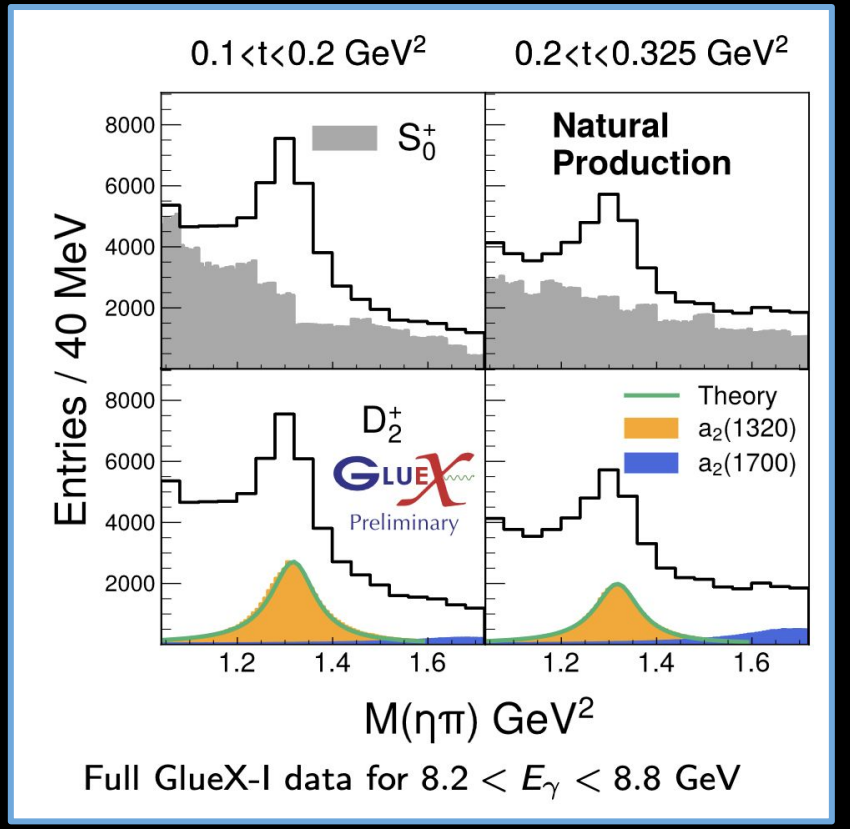
- The statistical precision achieved exceeds that of previous experiments by orders of magnitude
- Confirmation of a high degree of s-channel helicity
- Dominance of natural-parity exchange over the full t range
- The fits use the same machinery as the PWA fits



GlueX in the Making : the Golden Channel $\eta\pi$

- Semi-independent partial wave analysis of $\eta\pi^0$
- Cross-section of $a_2(1320)$ in $\eta\pi^0$





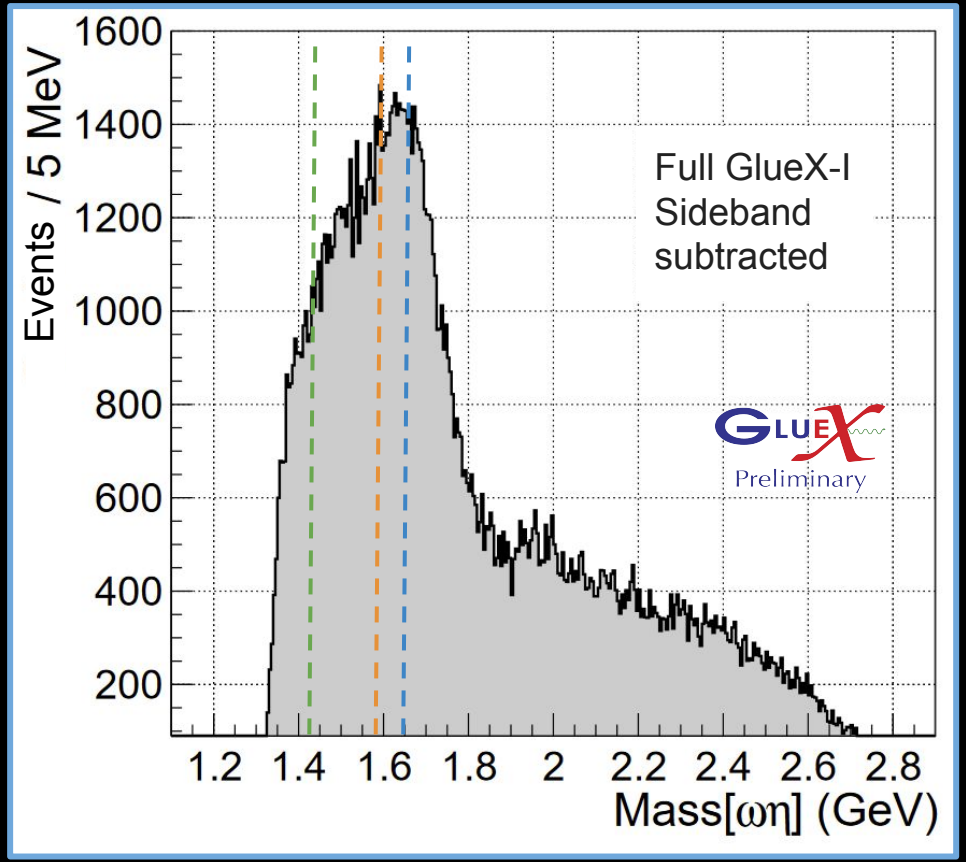
Search for Resonances in $\omega\eta$

- The integral of M[$\omega\eta$] with sideband subtraction is ~143k
- Expected states and their PDG estimate:

  -ω(1420) width: 290 MeV

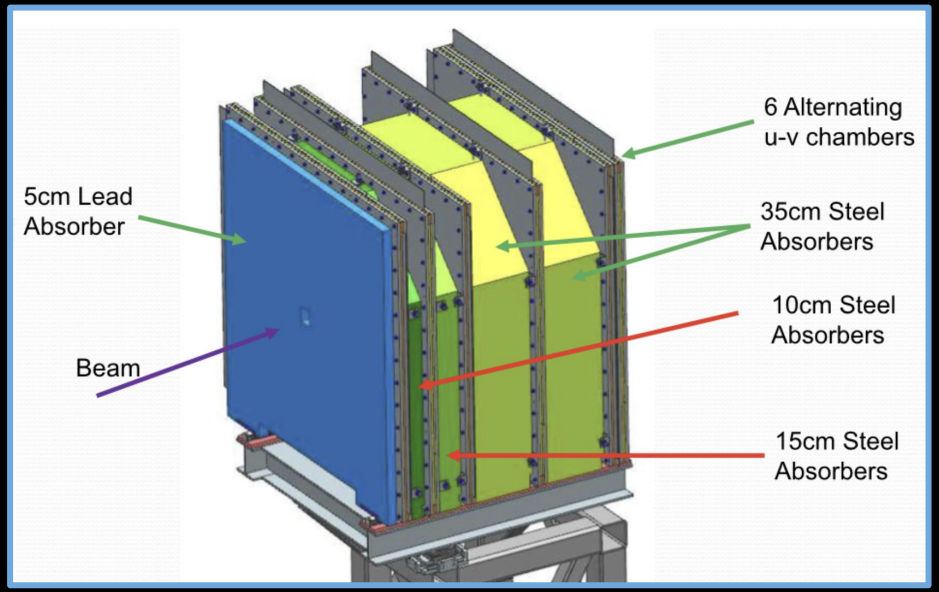
  -h_1(1595) width: 385 MeV

  -ω(1650) width: 315 MeV
- PWA analysis in progress



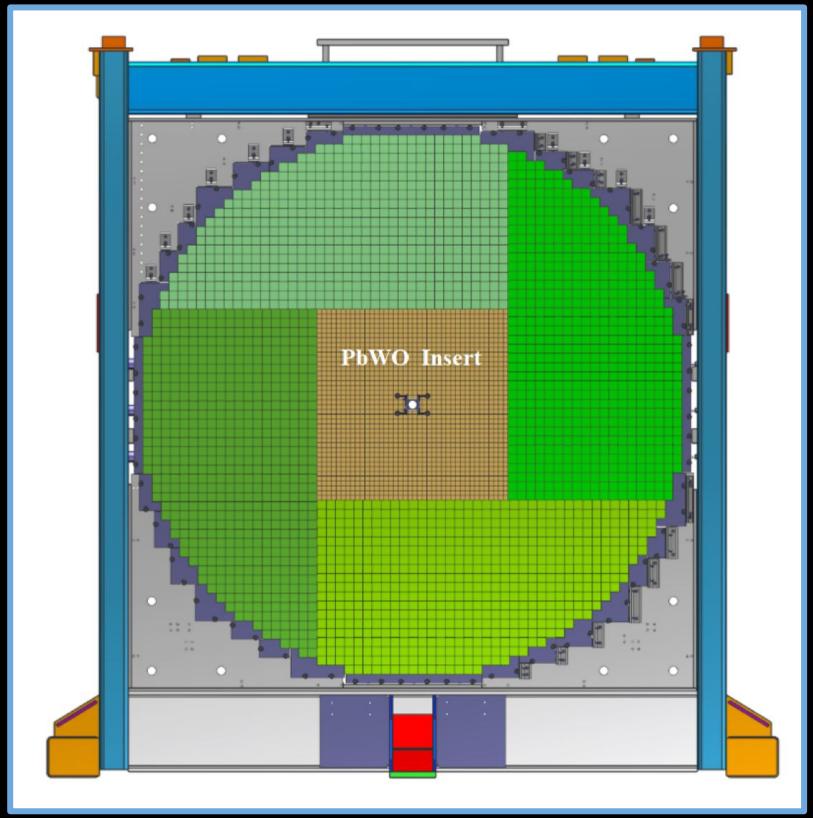
Charged Pion Polarizability (CPP)

- CPP's goal is the extraction of the pion polarizability parameters via pion pair production cross section measurement
- It introduces a muon detector after the FCAL
- All the data was collected last year and it's under analysis



JLab Eta Factory (JEF)

- JEF's goal is to explore rare η/η' decays
- These decays can give insight into topics like chiral perturbation theory and dark matter searches
- The FCAL was upgraded to have more granularity in the center region.



Summary

- Experiments like GlueX, CPP, and JEF can probe unique physics thanks to Hall D's linearly polarized photon beam
- GlueX Phase I is being analyzed and results are being published
- CPP and the first part of GlueX Phase II are starting to be analyzed
- JEF and the second part of GlueX Phase II will be taking place next year
- Primex has collected all of its data. A publication on the Compton cross section is under internal review and an analysis of the η Primakoff cross section is under way

GlueX acknowledges the support of several funding agencies and computing facilities: gluex.org/thanks