

Outcome of PAC 36 (December 2010)

- Report: http://www.jlab.org/exp_prog/PACpage/PAC36/PAC36_report.pdf
- GlueX (E12-06-102) received an A rating
- “Due to the strength of its scientific program, GlueX is a flagship experiment of the 12 GeV upgrade with unique physics opportunities and the potential for groundbreaking discoveries. The PAC recommends the allocation of 120 days of beam time as requested by the collaboration.”
 - assumes 100% efficiency
 - likely covers the first year of “production” 12 GeV running (2017?)
- Notable comment:

“Finally, the PAC would like to express its hope that the descoped Cerenkov detector be revisited at some time in the future. The loss of kaon identification from the current design is a real shame, but entirely understandable given the inescapable limitations on manpower, resources, and time.”



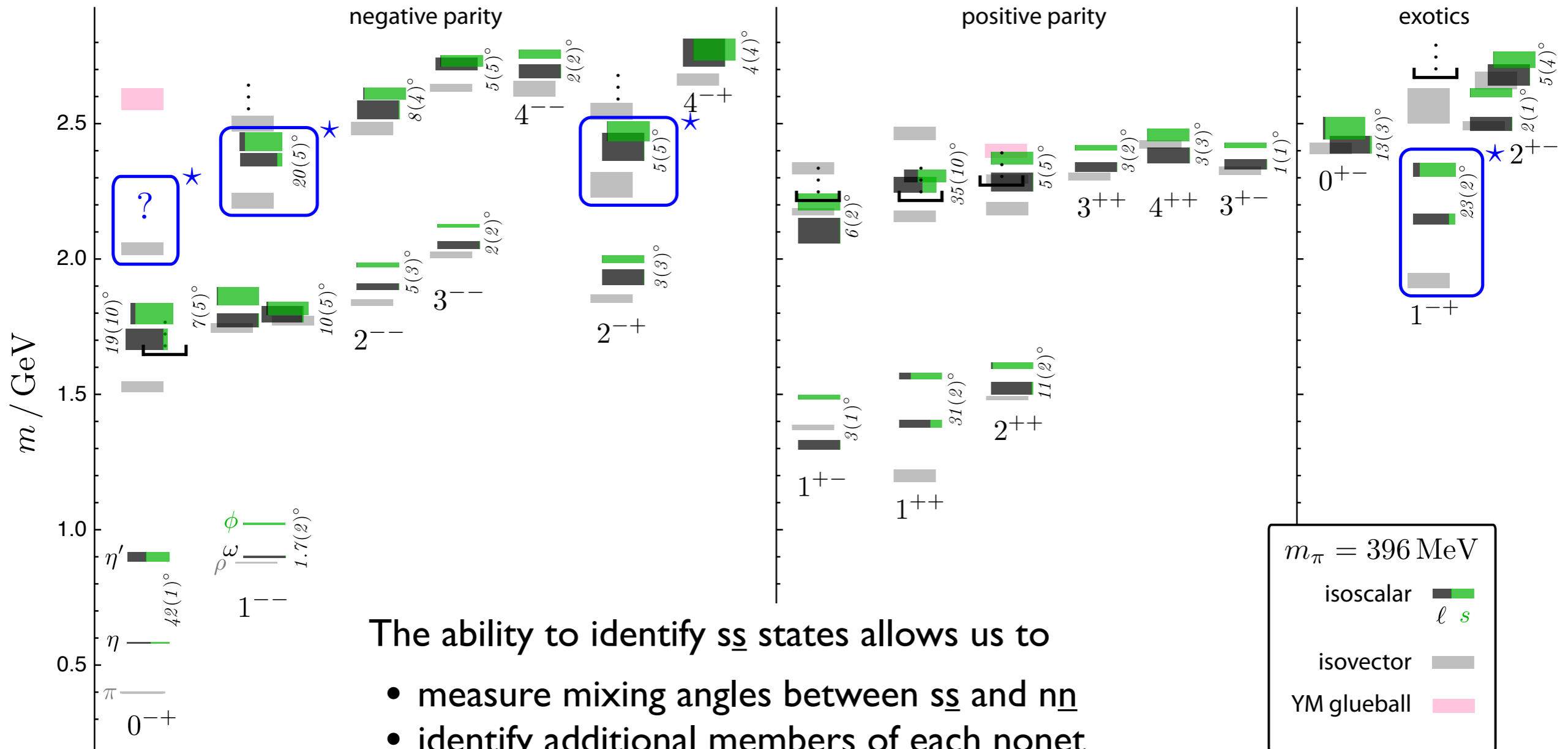
Planning for the PAC 39 Proposal

- (From the PAC 39 solicitation:) As in the recent past, the criterion for approval of new proposals will be that the proposal represents "high quality physics that, based on what we know today, is highly likely to be of sufficient scientific merit that it will be included in the top half of the priority list to be established for the first 5 years of 12 GeV operations."
- Important Dates
 - Proposals due: May 4
 - Presentation: week of June 18
- Major physics topic: ability to study $s\bar{s}$ states
 - needs kaon identification; K^+K^- decay modes
 - higher mass requires higher intensity
 - production is suppressed at high momentum transfer



Physics Motivation

J. Dudek
PRD 84, 074023 (2011)



The ability to identify $s\bar{s}$ states allows us to

- measure mixing angles between $s\bar{s}$ and $n\bar{n}$
- identify additional members of each nonet
 - we would like to see π_1 , η_1 , and η_1'
 - $s\bar{s}$ vector mesons are also interesting



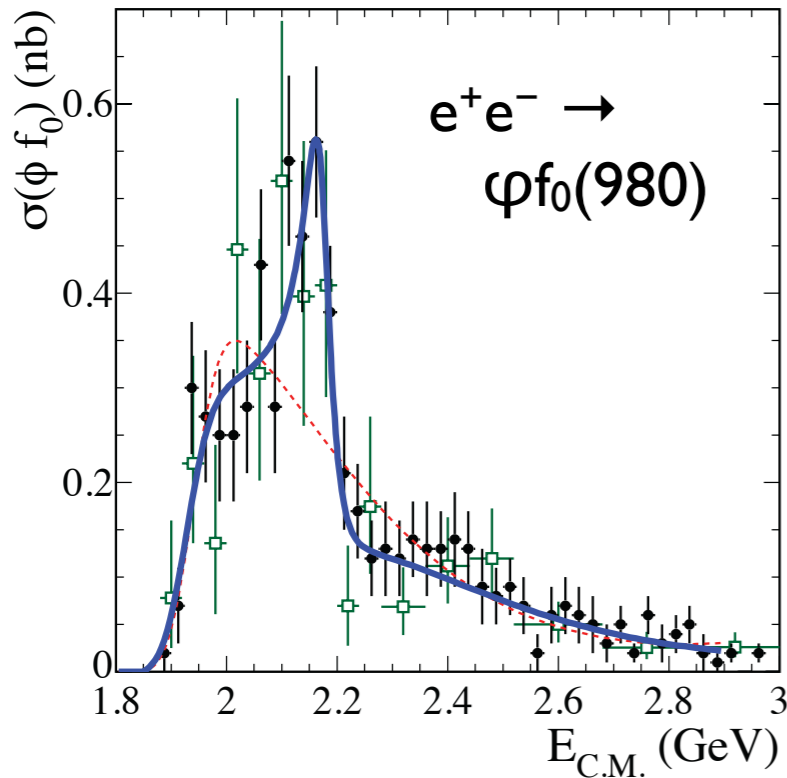
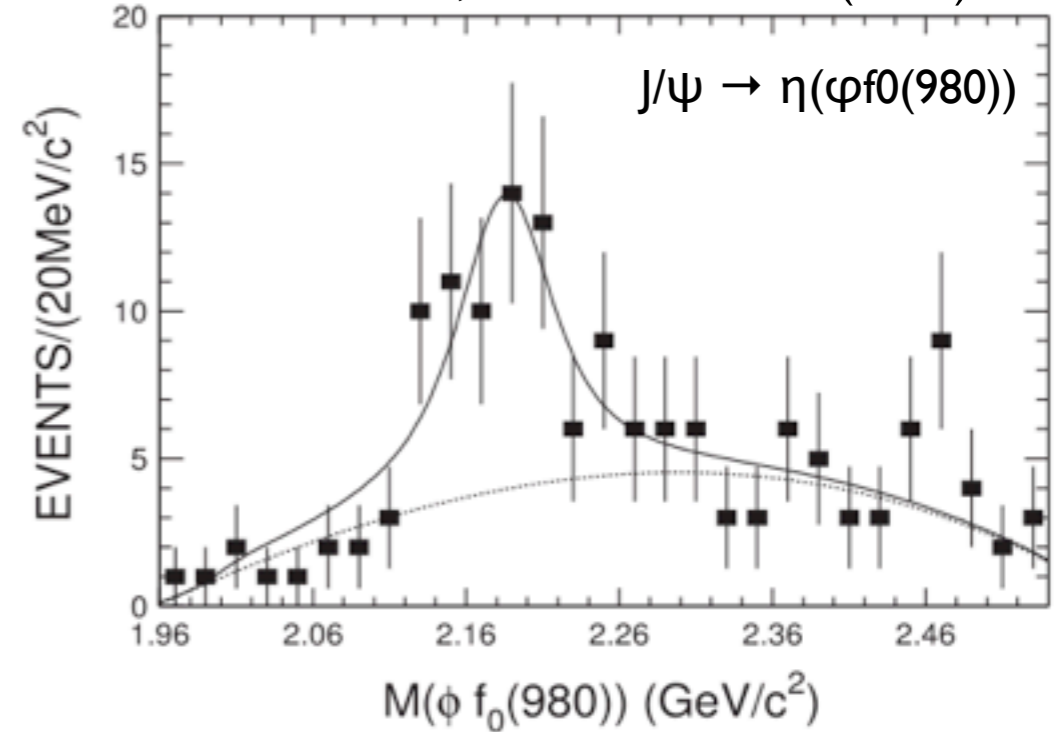
DEPARTMENT OF PHYSICS

INDIANA UNIVERSITY
College of Arts and Sciences
Bloomington

The Y(2175)

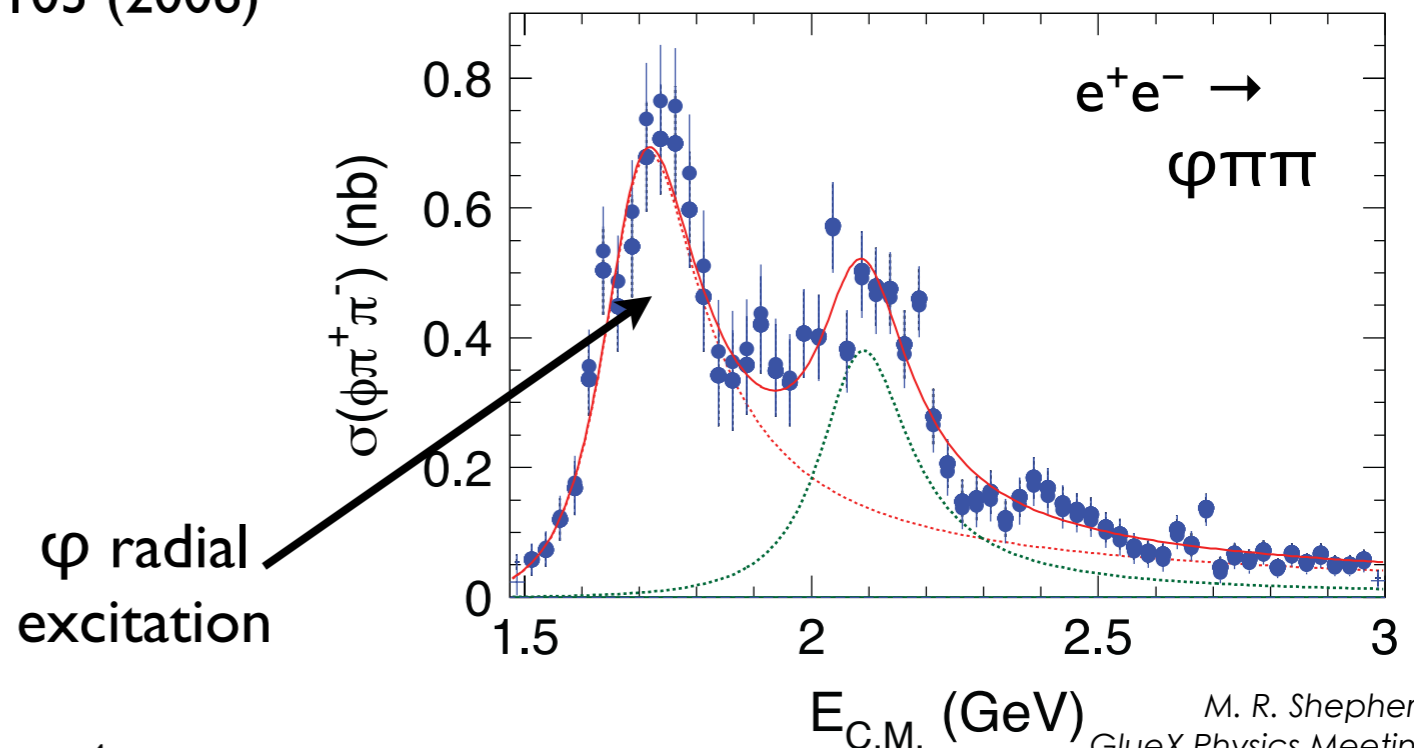
- Candidate for hybrid strangeonium with I^- quantum numbers – analogous to Y(4260) in charmonium
- observed by three different experiments in two different production mechanisms
- may expect a large cross section in photoproduction according to “vector meson dominance”?
- excellent state for benchmarking GlueX PID capability

BES Collab., PRL 100, 102003 (2008)



BaBar Collab.,
PRD 74, 091103 (2006)

Belle Collab., PRD 80, 031101(R) (2009)



Need for New Equipment

- We would like to use this PAC proposal to motivate the need for equipment that has been “descoped” from the baseline construction project
- PAC approval will provide ammunition for securing external funds to take on detector construction projects
- Key components:
 - comprehensive PID system (RICH?)
 - need a detector whose capability meets physics goals
 - unlikely to specify conceptual design before PAC; recall that workshop is planned for May 2
 - L3 farm
 - needed for high intensity running
- *Any other components need to be identified now*



PAC Guidelines

- About new equipment:

“It is essential that the proposers understand that a positive recommendation from the PAC about the scientific merits of such a proposal will only be the first step toward a final decision about their execution. Subsequent steps will include detailed technical reviews, the development of funding to support the construction, and the establishment of a project framework for its construction and installation.”

- Each proposal for major new equipment must include
 - From each group of proposing scientists and institutions:
 - a clear statement of their intention to participate in and contribute to the construction of the new equipment
 - a summary of the responsibilities they will undertake as part of the construction effort, and
 - the identification of financial and human resources now available to them in support of the effort, and
 - The proposal must also include summary statements identifying:
 - resources that will be requested from JLab as part of the construction effort, and
 - a strategy to obtain the resources necessary to cover the entire construction and installation effort.

We need to identify interested institutions now and collect the information above.



PAC Proposal Outline

- Introduction
 - broad emphasis on role of spectroscopy
 - include any recent (since last PAC) developments in experiment or theory
- Status of GlueX Construction
 - activities of collaboration: reviews and new members
 - subsystem construction milestones
 - software and analysis development; studies of 3π (need for pion purity)
- Physics motivation for studying states with strange quarks
 - lattice calculations of the spectrum and mixing angles
 - experimental candidates for s s -bar hybrids and connections to charmonium
 - baryon spectroscopy (need additional input here from FSU)
- GlueX detector upgrades and run plan
 - broadly discuss the necessary PID capabilities; use $Y(2175)$ as a test case; note 3π backgrounds; baryon decays (?)
 - motivate the need for high rate (high t suppression); discuss new equipment needed
 - present beam time request, expected statistics
 - discuss future design plans, institutional commitments, funding strategy, etc.
- Conclusion



Next Steps

Needed now:

- Subsystem experts should consider what modifications are necessary to accommodate 10^8 running
- how will detectors perform at 10^8 ?
- Specific physics channels to build the argument for kaon ID
 - strategy: use specific channels, e.g., $Y(2175) \rightarrow \Phi\pi\pi$, as benchmark cases, but stress general applicability of kaon ID
 - some simulation of kinematics (momenta and angles) will be needed
- Which institutions are interested in being involved in aspects of an upgrade? What resources are generally available?
- *I will start drafting the proposal with the goal of having a draft to circulate by the second week of April*

