

JEF Meeting Agenda

Dec 7, 2012

(1) PAC comment #1: “This promising but ambitious project did not make a convincing case that it would be able to run that quickly. The proposed JEF and GlueX itself are unique in the world; with no competition envisioned, this new undertaking seems suited for a later phase of Hall D running that covered by PAC39’s charge”

- Planned FCAL-II development and construction timeline (Dave)
- What is Hall D first five year’s running plan?

(2) PAC comment #2: “We encourage the proponents to carry out a more detail study of the cost and required people-power for the new PbWO calorimeter”.

- FCAL-II budget, foreign contributions, funding plan
- Task list of FCAL-II development, list of institutions who are involved
- MOU with several Russian and Chinese institutes. Future support for visitors.
- Possible new collaboration with other groups

(3) PAC comment #3: “The PAC also felt that the physics case for this large instrument could be strengthened”.

- Modify the “motivation” part of the proposal to make a stronger case.
- Simulations including FCAL-II to show how the new calorimeter could have impact on the GlueX physics and eta-Primakoff
- Involve theorists in the discussion
- Background simulation for 3gamma decay channel (Sascha)
- Dark photon search

(4) Other business for the next PAC...

Title: Symmetry Tests of Rare Eta Decays to All-Neutral Final States: The Jlab Eta Factory (JEF) Experiment

Spokespersons: L. Gan, D. Mack, A. Somov

Motivation:

The main goal is to tighten the present constraints on new sources of charge conjugation invariance C, Parity violation P, and CP violation in hadron decays. Rare neutral decays of the eta meson provide a unique flavor-conserving laboratory to search for new sources of C, P, and CP violation and to test predictions of chiral perturbation theory at higher order. The proposed experiment will reduce by one order of magnitude the existing upper limits on the branching ratios of two channels that are forbidden in the Standard Model: $\eta \rightarrow 2\pi^0$ (P and CP forbidden) and $\eta \rightarrow 3\gamma$ (C forbidden).

Measurement and Feasibility:

The experiment appears to be feasible and is well suited for the tagged Hall D photon beam. The beam conditions required, such as the electron beam current, the radiator and the collimator, are similar to those of the approved (PAC37) PRIMEX experiment. In contrast with PRIMEX, no accurate luminosity measurements are needed.

Issues:

The experiment requires a major upgrade of the standard Hall D equipment including the replacement of the lead glass forward calorimeter (FCAL) with a new high resolution PbWO calorimeter with flash ADC readout on every crystal. The PAC has concerns about costs and people-power. The cost of such a calorimeter is expected to be on a scale of several millions and will need considerable manpower to operate and maintain it. The PAC also felt that the physics case for this large instrument could be strengthened. On one side, the flagship physics case — testing the standard model — would be sharpened by removing focus from the more model-dependent results and concentrating on the cleanest standard model tests. On the other side, the PAC would like to see more exploration of the broader, secondary physics program that the new calorimeter could support, e.g. what could be learned from the angular distributions of other (non-forbidden) all-neutral final states as measured by this high-resolution device?

The PAC's present charge defines "approval" of an experiment as placing it in the "top half of the priority list for the first 5 years of 12 GeV running". This promising but ambitious project did not make a convincing case that it would be able to run that quickly. The proposed JEF and GlueX itself are unique in the world; with no competition envisioned, this new undertaking seems suited for a later phase of Hall D running than that covered by PAC39's charge.

Recommendation: Defer

We encourage the proponents to carry out a more detailed study of the cost and required people-power for the new PbWO calorimeter. We also encourage them to include the new device in the ongoing design studies for upgrading GlueX's forward particle identification (Threshold Cerenkov counter vs RICH). All experiments in Hall D will likely benefit from the availability of an improved forward particle identification system.