

**From:** Zisis Papandreou <zisis@uregina.ca>

**Subject:** reconstruction plans

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**To:** Matt Shepherd <mashephe@indiana.edu>, Blake Leverington <leverinb@uregina.ca>, George Lolos <George.Lolos@uregina.ca>



Hi Matt and Happy New Year:

We've had some discussions here about Blake's work. Here are some thoughts I have so that we can discuss them and then come up with a plan.

Resources

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Alex had done a lot of work and -- thank God -- had put much of it in Portal. The key docs are GlueX-doc-817 (eta pi0), -838 (kinematics overview and reactions with b1(1235) and Delta) as well as -985 (complementary to 838). Another good report is -1006 (3pi production).

Reactions

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For Blake's work, we have several reactions of interest.

- 1)  $\gamma p \rightarrow a_2(1320) p \rightarrow \eta \pi^0 p \rightarrow 4\gamma p$  (four photons plus recoil proton)
- 2)  $\gamma p \rightarrow X(2000) n \rightarrow b_1^+(1235) \pi^0 n \rightarrow \omega \pi^+ \pi^0 n \rightarrow \pi^+ \pi^- \pi^0 \pi^0 n \rightarrow 4\gamma 3\pi n$  (four photons, three charged pions and a recoil neutron) -- another variant of this goes through f1(1285) into six photons two charged pions and the neutron
- 3.)  $\gamma p \rightarrow X(1000-2500) \Delta(1235) \rightarrow X \pi^0 n \rightarrow 2\gamma X n$

I regard 1) as our physics calibration equation, 2) as an exotic, 3) as physics background. 2) and 3) have recoil neutrons and 2) has charged particles in the final state. Of course these can be tagged using the truth/throw tags. 1) has all neutrals, covers polar angles up to 40 deg or so, min energy photons up to 2 GeV (max photons up to 7 GeV). 2) covers <200 MeV and <50 deg mostly, and 3) <400 MeV and <100 deg. So all three populate both FCAL and BCAL to varying degree.

It makes sense for Blake to start with 1). Later on check charged hits in the calorimeters, and after that look at neutrons as well.

While working with 1) we are thinking of testing the threshold as a quick and dirty check of single-ended hits by looking a) threshold way down, attenuation way up as you suggested, b) attenuation reasonable (the 300 cm the code has or 350 cm that Kuraray claims) and threshold at nominal (6 MeV), 3 MeV and 9 MeV to get a feel. Data can be tagged for neutrals only (cut out recoil proton), FCAL/BCAL, and vs z. We want to look at theta and phi and of course the end product of pi0 and eta invariant masses. En route we'll check efficiency of reconstruction.

Matt, any thought, input?

Cheers and have a nice weekend, Zisis...

P.S. Hope you can read the Greek symbols above. Just in case, I am attaching this email in PDF form as well.

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