

CERENKOV STATUS UPDATE

From: Brad Sawatzky <brads@jlab.org>
Subject: Re: Transversity phone call, Tuesday March 11th, 11:00am EST.
To: Xiaodong Jiang <jiang@jlab.org>
Cc: Jian-Ping Chen <jpchen@jlab.org>, Jen-Chieh Peng <jcpeng@uiuc.edu>,
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On Mon, 10 Mar 2008, Xiaodong Jiang wrote:

> **1. What parts are still missing ? the rough estimated delivery date.**
> **Can JLab help ?**

I'm waiting for the mirror mount parts to be fabricated at Rutgers. The formal shipping deadline had been the first week of April at the latest. I heard last week that the work was "almost done," so I'm actually expecting the parts to arrive in the next week or so.

UPDATE: Ron tells me they should arrive sometime this week. The conical mirrors are being shipped to JLab now--they should arrive this week.

UPDATE: They arrived and are in TestLab.

An order for 100 lb tank of C4F8O gas was placed a couple of weeks ago. It should arrive by early/mid April. Keep in mind that we will be doing all of our testing with CO2.

The 100 lb tank of C4F8O should be enough for two complete fills plus about 45 days of (intentional) venting losses to compensate for atmospheric pressure fluctuations.

I plan to be ready with a fill of C4F8O for the start of GEp/GMp. If we have lots of light and pile-up in the background is low enough to stick with the planned ~3 p.e. threshold then I would like to switch to a CO2 fill during some opportunistic down and see how that goes. If CO2 looks viable, then we can save some cash during Transversity/d2n. I redid my cost estimate from the review document using this new gas. The amount of money involved in using C4F8O for the full experiment is roughly:

\$1600 (initial fill)
\$3200 (reserve gas)
\$2400 (gas consumption during experiments)
~\$13/days x 180 days (Oct. 2008 -- April 2009)

Total: \$7200 for 6 months of running.

That works out to less than I thought. It should be easy to fit into the Ops budget for next year. (FYI, using C4F10 as initially planned would increase the cost by at least a factor of 3 -- let's hope C4F8O works as well as it's supposed to.)

I strongly support sticking with the plan to use C4F8O for the production runs.

> **2. Any additional designer's effort needed while installing Cherenkov
> into BigBite package ? Any extra modifications ?**

I haven't seen any problems that would require additional designer effort.

> **3. A rough timeline for the mirror-alignment/assembly work.**

Already begun:

- Pre-assembly (PMT mounts, mag shields, gas windows, etc).
- Layout and walkthrough of the alignment, electron stack modification procedure, and mounting procedure.

Still to do:

- double check that the GeN Pb-glass trigger is still good to go
- that's the only trigger needed for GEP/GMP and for the Cerenkov test
- the Cerenkov "trigger" will be cabled up (since it's already complete), but will not be used as an actual 'DAQ' trigger.

These items will begin in earnest as soon as the parts arrive:

[Apr. 7 -- 14 at the latest]

NOTE: Apr. 7 is the agreed upon worst-case delivery date from Rutgers.

It looks like they may be ready this week, so you can slide the Cerenkov work forward by at least two weeks.

- Install mirror mounts + mirrors.
- Align mirrors.
- For the purpose of the test, we really only need 2--4 of the 20 sets of mirrors to be precisely aligned. That will be a baseline 'must' given the short time frame. Aligning the rest of the mirrors will be a 'like'.
- All PMTs will be installed and cabled up regardless.

- Cosmics testing.

[Apr. 14 -- 21]

- I will use my small DAQ (32 ADC channels + 128 TDC channels) to run these tests. We have all the hardware we need in Testlab (ie. it's independent of the equipment moved to the Hall for pi0.)

Modifications to the electron stack.

[Apr. 7 -- 21]

- this will be done while pi0 is running (~Apr. 1 is the earliest start date)
- Ed Folts is in charge of this.
- He has the drawings.
- We have all the new parts staged in Testlab.
- He will do what he needs to in order to get it done.

Installation of Cerenkov tank into electron stack

[Apr. 21 -- 28]

- It will be loaded into the stack while in Testlab.
- I would like to have the mirrors aligned and have some cosmic data take prior to 'test fitting'. Once it's in the stack I would like to take some more cosmic data to verify that the alignment didn't get screwed up (and correct the alignment if necessary.)
- Correcting the alignment requires removing the front window only. We do not have to pull the whole Cerenkov from the stack.

"Spare" time.

[Apr. 28 -- May 7]

- We all sip Mai-tai's and relax on the beach.

Move to the Hall and configuration change for GEp/GMp

[May 8 -- May 15]

- pi0 is scheduled to end on May 7
- the changeover runs from May 8 -- May 15
- GEp/GMp runs from May 16 -- June 7

Commissioning and testing during the May run:

- Our tests may be done almost entirely parasitically to the the GEp/GMp measurement.
 - It is unlikely that the Cerenkov will be in the experiment's production trigger, but the d2n/transversity trigger will be cabled up and recorded by the DAQ. Background, threshold, and efficiency analysis can be done in parallel with the GEp commissioning.
 - GEp plans roughly 1 week of commissioning. One of the formal items to be commissioned is the Cerenkov.
 - the details of commissioning and the GEp run plan are still being finalized
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- Note that the baseline MWDC performance will be established during the pi0 run in April. If the background rates in the chambers can be handled under those circumstances then we will be fine during the He3 runs.

There has been discussion with the pi0 spokespeople of taking a shift of 5 pass beam at the end of the experiment to determine how much the background rate will drop as the beam energy goes from 1.2 GeV -> 6 GeV. They were open to that suggestion in the past, but I will follow up with pi0 and Kees to make the request formal. The 5 pass test would be done only if there are significant background problems that look like they would impact the planned luminosity for d2/transversity.

We will also plan to install the 3rd chamber in the electron stack and have it at least partially cabled for GEp. This would be a 'like,' not a 'must,' and would be the third priority behind the set-up of the Calorimeter (must), and the Cerenkov (must).

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- > **4. A list of minimum test/performance requirements to be completed**
 - > **before installing it into the BigBite frame.**
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Assembly and cosmic tests. Locate single p.e. peaks in ADC spectra and complete gain matching of PMTs. We will attempt to get some baseline p.e./track data using cosmic with both CO₂ and C₄F₈O.

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- > **5. Manpower available (physicists) and tech support needed.**
 - > **What else are we waiting for ?**
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Grad students: Huan, Nikos, and Youcai have all offered to help.
Post-doc: Vince and myself
That will be enough manpower for the assembly/alignment/testing work.

The weldment modifications will be done by Ed + techs. Ed figures it should only take a few days to a week.

> **Test Lab space**

The Hall C Hypernuclear equipment that tied up the Testlab last month space was moved a few weeks ago. We have a 16'x20' piece of the former Hall C space officially assigned to us for the Cerenkov work. It should be fine.

UPDATE: Hall C appears to have shuffled around their equipment last Thursday and is now encroaching on our space.
Don't panic, we'll get it straightened out.

> **Order material for 2 spare spherical mirrors?**

Summary/Reminder:

Sub-contractor broke 2 of 22 spherical mirrors. We now have 20 mirrors on-site (which is a full set for the Cerenkov), but no spares.

EuropTec is sticking with a minimum \$2500 order policy. Since each mirror blank is around \$110/each, this is would buy another 22 mirrors when we only need 2.

Last week Evaristo and Haiyan kindly offered to split the cost of the additional mirrors if deemed necessary.

UPDATE: Purchase of the spares will be deferred until mid/end April after the Cerenkov is assembled and tested with cosmic. If all looks good then we will take the risk of running without spares.