

From: Hans Jostlein

2/7/2009

Re: **My Comments on the Report about the LAr review of 1/26/2009**

I wish to thank the committee (and presenters ) for a well planned and useful review. Please permit me to add a couple of things in the hope of clarifying the issues. These are my comments, and they have not been reviewed by anybody. I get away with this kind of stuff because I am retired.

1. You may already know that I have been lobbying to plan on putting a long-drift skinny , tubular TPC into the LAPD tank early in its life. This will serve several purposes:
  - a. Put real chamber materials into LAr and the gas space to challenge purity
  - b. Verify/ study noise and grounding issues in a large tank
  - c. Confirm the purity by seeing actual tracks at varying distances from the wire planes
  - d. Demonstrate long drift capability with actual tracks. The HV feed system is particularly “interesting”
  - e. The number of channels that will be instrumented is not large, and can be driven by available electronics
  - f. While the present opening (30”) allows such a chamber to be installed, it would be nice to have a larger opening (40” or 48” diameter)
  - g. The chamber and all its serves would hang from a single flanged cover that will be pre-tested and inserted just before operating LAPD. A blank cover will be used until the TPC system is ready.
  - h. If we go ahead, our long time and experienced summer student Gordon Merchut will likely be available this summer, for the last time. We could build the TPC and feed throughs in the summer. A decision would be needed.
2. The question of LAr streaming motion is important for the reasons you have identified.  
I would like to add a few comments:
  - a. Purity distribution: We know from Luke studies that purity does not change quickly. For the small Luke tank change occurs over a scale of hour, if not days.  
If the liquid moves across the tank dimensions in a time short compared to that, then the purity will be uniform.  
For a tank several meters across, and a mixing time of 1 hour, say, the liquid needs to move at a mm per sec or so. Existing FEA models show this to be the case.
  - b. Effect on wires

With the present design of modular planes no wire will be longer than about 4 m. The wires will be of substantial diameter (0.15 mm ) and well pre-loaded. The wire deflection in streaming LAr is expected to be very small. A paper by Kirk McDonald (Document 121 V1 ) in LAr docdB has looked at the microphonic effect in such wires, and concluded that there is no problem.

c. How can we study the flow?

It may be possible to build a mechanical anemometer type flow meter. An alternative is to measure very detailed temperature distributions and compare them to the FEA model.

Even without the model, T distribution yield direct information on velocities via the density dependence of LAr on T.

Rich Schmitt and I discussed a crude, but inexpensive and effective system to measure one or more detailed vertical temperature profiles. A single T probe is moved mechanically through the liquid, to avoid cross-calibration issues of multiple probes. The probe is mounted on a vertical stick which is held and driven outside the tank and is sealed with a ridiculously long (thin, welded) bellows and guided by an outside track on a pole.

3. LAPD Location

We have found that it is incredibly important to place tests (such as Luke, Bo, Moby Dick, and Daisy) near where the people and their tools are. This means PAB.

I would strongly suggest to place LAPD outside PAB, somewhat close to it. The tank can be out in the open (with the purifying equipment in a “container” nearby), or the tank and associated stuff can be in a dedicated pole barn, which would be removed once the LAPD program ends. (I recently had a 30’ x 50’ pole barn installed for \$ 10,000.- complete. It is affordable.)

