

Minutes of the 18th Meeting of the SBN Oversight Board (Fermilab, September 9th, 2022)

SBN-OB Attendees:

- A. Guglielmi (ICARUS)
- O. Palamara (SBND Co-spokesperson)
- C. Rubbia (ICARUS Spokesperson)
- D. Schmitz (SBND Co-spokesperson)
- M. Shaevitz (US NSF)
- R. Wilson (US DOE)

Other Attendees:

- P. Wilson (SBN Program Head),
- A. Fava (ICARUS Dep. Spokesperson)
- G. Karagiorgi (Columbia University)
- K. McFarland (Rochester, IB Chair)
- D. Salmieri (ICARUS Scientific Secretary)
- J. Saviano (Secretariat)

Not in Attendance:

- S. Brice (Chair)
- S. Bertolucci (INFN, Italy)
- A. Ereditato (Switzerland)
- J. Evans (UK)
- M. Nessi (CERN)

Action Items

No Action Item

Introduction and Review of Last Meeting

In Steve's absence, Peter Wilson welcomed the members and participants to the Eighteenth Meeting of the SBN Oversight Board.

There are the usual agenda items, but we have no special topic to be discussed at this meeting, No action items from the last meeting

SBN Spokespersons,

D. Schmitz, SBND Spokesperson, provided an overview of the SBN Organization. SBN Board continues to meet regularly.

Recent topics include: 1) revisions to Rules Documents, 2) activities of the joint analysis working group, 3) participation at conferences, etc. for SBN Program.

Revision of Rules documents: Last communications included edited draft containing suggested updates and comments. Most substantial suggestions concern procedures of the RAC, after it's

been proposed to update its composition. Clarifications were given (section 4.4.1). Suggested addition of another statement to help avoid a new set of meetings, while satisfying need for broad communication/transparency within SBN.

Joint Analysis Working Group: SBN Board plans to meet with conveners regarding possible changes to structure of subgroups in WG.

Comments:

K. McFarland stated board meeting with the conveners is a good idea when there are some preliminary outcomes (from restructuring). Recommended outcomes/restructuring be broadcast more widely to give people some warning and a chance to react. D. Schmitz said it's under the purview of Georgia and Daniele to structure their group. There is a coupling of available excellent people to run that, and part of that is the feedback between the real conveners and the organization on how to structure things. It is a good suggestion to broadcast.

Update on SBN Institutional Board, K. McFarland

K. McFarland, provided an update on the SBN-IB. Slides presented Current goals – create standing committees to carry out key SBN processes and regular business of the IB, as specified in its by-laws. Regular business of the IB, as specified in its by-laws (opportunity to bring up other topics/concerns).

SBN IB Leadership; Kevin was re-elected to second term (ending April 30, 2024). Nomination of Elizabeth Worcester for Deputy IB Chair was ratified last week.

Activities: no meeting since last OB report. Next meeting scheduled for Sept. 21, 2022. SBN Board and Rules Authoring committees are iterating on drafts of the rules. Because of the change in the RAC composition, there were some significant changes in the rules. Few points might need discussion with IB.

Upcoming Activities: Hope revised versions will be swiftly approved by the IB and separate collaborations. Next IB meeting will focus on other SBN business (report on plans from the SBN Analysis Coordinators).

Comments:

Schmitz asked if any other feedback has been received from IB members. McFarland said a comment form was opened, but nothing received. He believes IB reps are waiting to weigh in. Thinks there will be some discussion point at next IB meeting, for example, procedure for approval of common SBN results for the RAC to carry out (how regular collaborators interact with that process).

SBN Project Update, P. Wilson

P. Wilson, SBN Program Deputy Coordinator. Slides presented.

ICARUS is complete, so further updates will be solely on SBND.

COVID-19 status update. Mask requirements dropped on August 26. Village gym and Users Center open. Still have limited food service in café. Lia hosted a lab-wide picnic on August 31. Meeting attendee limits were canceled.

Near Detector – SBND

- Light Systems (WBS 2.04) – Finalizing PDS Boxes, Testing PMTs and X-ARAPUCAs before final installation. PDS box installation on the APA back sides - four of eight PDS columns installed
- SBND Cryostat (WBS 2.09) – SBND Cryostat installation is complete. Preparing for next stages (cleaning, dirt protection, removing scaffolding). Top cap preparation and installation (Sept 20), then internal cryogenics piping and temporary floor will be installed.
- Assembly & Installation (WBS 2.08) – Prepping for detector move. Completed trial run of two possible routes. Second test run planned for next few weeks. Preliminary review of transport plan held Sept. 8th. Projecting detectors move for week of Nov. 16. (Slide of detector move timeline.)
- Cryogenics (WBS 4.03) – Installation has been paused for past few months while technicians supported cryostat installation. Vacuum jacketed transfer line expected delivery in early 2023. Installation will start after the detector is installed. Starting prep for moving LAr filter and filter regeneration panel from SBN-FD.

Milestone update – S2 SBND ready to fill with LAr by June 26, 2023

Comments: None

ICARUS Commissioning and Operations A. Fava

A. Fava, ICARUS Deputy Spokesperson, provided an update on commissioning and operations. Slides presented.

Presented timeline of ICARUS commissioning and operation. Detector operating since Aug. 28, 2020. Part-time data taking with Neutrino beams since mid-March 2022. ~65% dedicated to beam data collection since restart of beams on Nov 5th. Second full-time neutrino beam run June 9-July 10 2022: “RUN-1”.

List of activities during 2022 summer shutdown; argon refill and regeneration of recirculation filters, integration of bottom CRT, installation of PMT signal adders, Improvement of trigger/DAQ systems and TPC noise levels, Cosmic ray runs for calibration studies.

Interruptions/Changes noted: Major air conditioning system failure Aug 5-19. Cathode HV lowered for safety reasons. Three planned power outages (Aug 11, Aug 29, Sept 6).

Interventions performed on TPC readout electronics were installation of new grounding straps on the crates and a circuit on the Low-voltage power supply (LVPS), examination and mitigation of the Wire-Bias parasitic currents and Cryogenic Resistive Temperature Detectors (RTD) disconnected and grounded. The noise level has significantly improved.

Cryogenics and liquid argon purification system. Potential issues on cryogenics and purity (Lower e-lifetime in West module partially explained by lower LAr recirculation rate, life of the bearings of N₂ pump is less than expected, West LAr pump recently dismantled and inspected due to noise.)

Ongoing/planned activities on cryo system: continuous venting 2x/day resulted in ~6 cm loss of LAr level. Refill completed Aug. 31, operation at 350 V/cm allowed to test transparency of TPC Induction 1 and Induction 2 wires planes, removal and regeneration of the LAr recirculation filters in the West cryostat began Sept. 6. Expected to last 4-5 weeks.

Integration of the bottom CRT. Detailed plan ready to find any faulty boards, Hazard analysis approved Aug. 29. Work started on Sept. 6.

Installation of the PMT analog adders. Twenty-four PMT analog adder boards being installed and tested. Review of possible PMT analog adder trigger. Ongoing tests to study behavior of the adder electronics, find a suitable discrimination threshold, and compare analog and majority trigger frequencies.

Calibration runs. New 5 Hz configuration available and being tested. Request from calibration group to collect 20M events during the summer, but not possible with current schedule.

Updates on detector calibration. Measurement of diffusion effects. Graphs of TPC gain calibration and drift velocity dependence on temperature.

TPC wire transparency. Graphs of TPC channel to channel inhomogeneities in dQ/dx and MC/data disagreement in TPC signal response waveform. Both observations point to variations in transparency across TPCs.

Progresses in CRT-PMT Matching. Graph of time difference between CRT hit and matched PMT flash (in spill). Complimented by accurate measurement of time delay along both CRT and PMT signal acquisition and timing distribution levels. Graphs of time resolution of Cathode crossing tracks that matched to CRT hit and closest distance between CRT hit and TPC tracks. Current work is to validate the algorithm with data.

Comments: Palamara asked for explanation of variations in transparency. Fava – these variations in the order of 15-20%. Trying to compare these numbers with the previous run in Gran Sasso. It's not straightforward because we have to use the analysis that was available at that time. Some correlation on C=crate by crate of the facing plane. Plot shown is the dq/dx in the collection plane and seems to be in correlated with the direction of the induction 2-wire plane. This is why they're thinking of transparency issues. Investigating to try to understand the reasons and the other we need statistics to do channel to channel calibration independently. Studied with time

and it looks stable over time. Black box calibration is also possible. Need to understand where these 2 come from. There is an overlap. There are most likely several components of the issue which are overlapping.

Palamara – it's a huge number (15-20%). Would be good to understand.

Fava - Data still being analyzed and we didn't have time to take data in the different conditions. There were higher priorities.

SBN Joint Working Groups, G. Karagiorgi

G. Karagiorgi, Columbia University, provided an update on the SBN Working Groups. Slides were presented.

Reminder of the Working Groups (WG) goals shown with the new addition of the SBN Analysis Trigger WG. Their goal is to share and discuss strategies for cross-checking trigger efficiencies independently measured by the two detectors.

Not able to get updates from the Joint Working Groups due to various activities, Reviews and meetings. There also isn't much to report on.

- SBN Oscillation Analysis WG – New projected POT sensitivities evaluation and compared among all fitter groups.
- Main Activities include prioritization of activities for fall 2022
- Planning several workshops for high-priority, critical analysis inputs. List of possible topics.
- Organization and Analysis Strategy - rethinking how to revitalize joint working group activities, overall proposal to be presented to spokespersons, follow up on community feedback during Snowmass.

Comments: O. Palamara stated upcoming proposed workshops are really needed. Karagiorgi stated WG needs to identify missing conveners in order to make it happen.

The SBN-OB meeting was adjourned.

Next meeting 3 months from now on December 9, 2022