

Minutes of the 17th Meeting of the SBN Oversight Board (Fermilab, June 10th, 2022)

SBN-OB Attendees:

S. Brice (Chair)
J. Evans (UK)
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:

A. Fava (Fermilab)
D. Gibin (Universita di Padova and INFN Sezione di Padova)
G. Karagiorgi (Columbia University)
D. Salmieri (ICARUS Scientific Secretary)
J. Saviano (Secretariat)
P. Wilson (SBN Program Head)

Not in Attendance:

S. Bertolucci (INFN, Italy)
A. Ereditato (Switzerland)
M. Nessi (CERN)

Action Items

None

Introduction and Review of Last Meeting

S. Brice welcomed the members and participants to the Seventeenth Meeting of the SBN Oversight Board. There were no action items from the previous meeting.

SBND Spokespersons.

O. Palamara, SBND Spokesperson, provided an overview of the SBN Board discussions.

Suggestions from the SBN Board have been included in the new version of the SBN IB rules document. They will need to meet to discuss the remaining points, which are not significant, and will report back to the Rules Committee. They will go through another round of approvals.

D. Schmitz had nothing additional to add. C. Rubbia confirmed what was said and added ICARUS is now data taking. Need to know what is required in terms of development of the data. Need to make sure the data can be initiated for ICARUS in 2022. Needs to be discussed by the full group.

No comments/questions.

SBN Institutional Board Update - K. McFarland

Slides presented

Current goals: create standing committees to carry out key SBN processes, Regular business, as specified in its by-laws (including opportunity for members to bring up other topics and concerns).

SBN IB Leadership – first election held. K. McFarland’s term extended to April 30, 2024. In the process of proposing a candidate for deputy chair. Requires 2/3 ratification of the IB.

Activities since last OB meeting: held a meeting on June 1st; report from IB chair elections committee. Discussion of standards for attribution of contributions to SBN Software and of licensing options. Reviewed changes to the rules document. Question about organizing an SBN discussion at Snowmass was referred to the ICARUS and SBND Spokespersons.

Upcoming activities: once feedback received from SBN OB on revised rules draft they will vote to send rules to collaborations for ratification at next IB meeting, Next meeting will be held in July or September.

No comments/questions

SBN Project Update - P. Wilson

Slides presented

Quarterly Update:

Increased COVID rates in Fermilab region. Mask mandate reinstated. In person mtg limit of 50 people. Limited food service from cafeteria. Village gym reopened. Users Center not open yet. Onsite access procedure hasn’t changed.

ICARUS overburden Installation:

I-3b milestone complete. Installation of ICARUS is complete. Transfer of responsibility from SBN project to operations complete. Ongoing work - cryogenics and HVAC.

SBND Director’s Mini-Review:

Covered progress. 3 charge questions:

1. Is Near Detector making satisfactory progress? Yes.
2. Has program responded satisfactorily to the ten recommendations from previous review? Yes.
3. Are there any additional significant concerns to be brought up? No.

Specific comments on 4 were not completely addressed. These are in progress and should be completed by next annual review (late October or November). One new recommendation: follow up to cryogenics recommendation concerning use of Safety PLCs.

SBND Assembly Progress:

- Top and upper-side field cage modules successfully installed on east and west, all connections complete and tested.
- Cold electronics installation completed.
- High Voltage Feedthrough progress, Baseline in production, estimated arrival in June. Spare HVFT onsite, “mock” HV port fabricated for alignment testing, electrical testing of whole HV chain in preparation at PAB during summer.
- One task left for S1 – install lower side field cage modules next week. Still at DAB, but beyond S1 is PDS installation & Detector preparation for move.
- X-ARAPUCA final assembly completed.
- PDS final installation preparations – completed. Calibration system – fiber installation complete.

TPC ready to move to SBN ND. Forecast date 15-June 2022

SBND Electrical /Installation:

Electrical: AC power and conduit installation for cryogenics controls complete, AC power for ground floor detector DAQ racks to contract – complete.

CRT Temporary install – North & south panels operational, both integrated into DAQ.

Commissioning of DAQ/Trigger systems with beam muons in progress.

Membrane Cryostat Installation:

Phase II began 3-May, installation of 2 layers of rigid foam insulation

SBND Install coordinator working with 6 people Gabadi, 2 from CERN, 3-4 from Fermilab.

Schedule has been 55/hrs. week, 10/hrs. day with ½ day on Saturdays. Phase II almost complete.

Team leaves 14-June. 7-10 days’ work remaining.

Membrane Cryostat Installation – Final Phases:

Trying to advance arrival of some team members. Scheduled to return in early July. At end of Phase III, CERN and FNAL people will complete leak test of primary membrane (Phase IV).

After the membrane: Cryostat top caps:

Delivered from CERN to Fermilab on 3-June. Three pieces of detector cap and one cryogenics cap. June/July will weld protection rings onto penetration pipes to reduce chance of breakdown to sharp edges. Plan to complete membrane installation at end of summer.

Critical path to S4:

Membrane Cryostat completed – forecast early September

Move detector from DAB to ND – forecast mid-January 2023

Cryogenic operation approved – forecast early June 2023

SBND detector ready to fill with liquid Argon – forecast June 2023

Special thanks to Run-Coordination, Filippo and Francesco (who were at Fermilab during time of installation), for their hard work coordinating with and overseeing the rigging crew on a daily basis. It wasn’t just an installation job by the program, it was the experiment coordinators playing a key part.

Comments/Questions:

Question for clarification regarding meeting participant limits. No meetings at Fermilab are allowed to have more than 50 participants in the same room. Meeting limit is capped at 50, no splitting between rooms.

ICARUS Commissioning and Operations Updates - A. Fava

Slides were presented

Presented timeline of commissioning and operation.

- 24/7 shifts since 14-February 2020. Remote shifts since 17-March 2020. Run Coordinator and Deputy change every 2 months.
- Part-time data taking with neutrino beams since mid-March 2020
- First BNB neutrino full-time neutrino beam run 31-May through 27-June 2021
- 7pm-7am weekday and full weekends dedicated to beam data collection
- CRT components in data since 17 February 2022
- 3m thick concrete overburden installation completed on 7 June 2022

Slides presented for each of the following:

- Status of the cryogenic system: Running steadily since detector activation. During summer shutdown, plan on regenerating the liquid recirculation filters of the West module, possibly resulting in an improvement and equalization of the purity.
- Installation of overburden: completed June 2022
- TPC Power Supply Temperatures: Problem with increase of the temperature on the top plate of the detector. Situation improved by rebalancing building HVAC and installation of additional fans. More HVAC refurbishing will take place during summer shutdown.
- Commissioning of Cosmic Ray Tagger (CRT): Top and Side taking data steadily with TPC and PMT systems. Bottom CRT DAQ still needs to be integrated.
- Data Quality Monitoring: Recently became fully integrated and made available to shifter for continuous monitoring of the quality of data being taken.
- Data taking w/BNB + NuMI: Average repetition rate 4Hz. Overall efficiency of beam data collection >85%.
- Trigger Performance: Rates are slightly less than 200 mHz, total rate is <1Hz.
- Tuning of detector modeling: Update of TPC noise model in simulation had much better match data.
- Track Reconstruction: data/MC comparison
- PMT-TPC association for cathode crossing u in data: simplified algorithm to compare track and light barycenter along longitudinal z axis.
- CRT timing: Side CRT time reconstruction relative to the gate start time. Coincidence gate windows larger than beam gates. Excess of CRT activity during the gate is due to trigger bias

Strategy for assessing completeness of commissioning: Checklist prepared by Tech Coordination team to survey status of completion of the commissioning for all detector sub-components. (Overview of checklist slide)

Most relevant pending tasks are integration of bottom CRT in data taking; possible tuning of trigger configuration based on output of measurements of trigger efficiency on data samples; re-assessment of the stability of the detector operation after completing the installation of the overburden.

The data collected so far with both cosmic rays and neutrinos from BNB and NuMI have been instrumental for calibrating the detector and tuning simulation and reconstructions tools.

Comments/Questions:

C. Rubbia commented he is surprised that the lifetimes that are here today are substantially less than was obtained when operating in Europe and there is no clear reason why. Plans to recover the efficiencies of the lifetimes to be close to the values that was had when operating in Italy.

A Fava said there have been many attempts to understand the reason for this (late searches, trying to increase the speed of the gas argon, liquid argon recirculation). It improved the initial value, but hard to get good recirculation. Filters for the left module need to be regenerated. Goal is to bring up both modules to at least the 5-millisecond lifetime level, but it will still be less than it was at Gran Sasso. The cryogenic system is different, so it's possible the heat load is different and that we have more electronics inside the top flange. It's harder to get good recirculation of the gas. The cryogenics team continues to work on this to try to improve the situation.

SBN Joint Working Groups Update - D. Gibin

Slides presented

List of SBN working groups and their goals presented

DAQ and Data Pre-processing:

ICARUS DAQ commissioned and ready. Plans for summer shutdown being finalized.

SBND DAQ development, integration /early commissioning efforts ongoing

SBN Analysis Infrastructure Group (Present)

- Change of leadership. Chris Backhouse is replacing Joseph Zennamo. Wes Ketchum continues as convener for group.
- 2022A” MC production underway
- Presented at Fermilab Computing Resources Scrutiny Group – resources are manageable at this point, but extremely limited by rate of reads/writes to tape; relying on “keep-up” processing of detector data to perform signal processing and reduce data volume.
- Ongoing improvements in many areas, particularly in common analysis format (CAF) files to support analysis work and continuous integration and validation framework.

SBN Analysis Infrastructure Group (Future)

Begin planning for 2022B MC production

Working to converge with DUNE on systematics treatment infrastructure

Work with ICARUS Analysis Taskforce to facilitate oscillation analysis of first ICARUS data

SBN Slow Control WG

CRT power supply monitoring: Top CRT completed. Working on side CRT.

Alarm System: Infrastructure for reporting alarms is operational. In progress: Automated system start-up, expand systems monitored, recording all alarms for review in database.

SBN Analysis Trigger WG

Mini workshop on configuration of PMT readout completed. Next workshop will address strategies for evaluating trigger efficiency. Reviewing the trigger hardware functionality, working to develop a “trigger menu.”

SBN CRT WG – SBND

Ivan Lepetic stepping down from CRT Convener

sbndcode now has time of flight module and completed study for optimal location for top plane. Some changes to CRT simulation implemented. Studying what MINOS modules look like in SBND.

SBN CRT WG – ICARUS (slide already shown)

Continue with commissioning. Starting to benchmark the MC simulation. Working with CRT-TPC and CRT-PMT matching reconstruction tools. CRT-TPC matching code ported from SBNC, in validation stage using ICARUS data

SBN Oscillation

Kicked off detailed comparisons between different fitter frameworks. Next step to integrate actual reconstruction into the analysis and complete the detector systematic study. Some study of NC disappearance search.

SBN event reconstruction: MC Study (ICARUS)

An exercise to apply fitting methods to fully reconstructed MC events and study variations w.r.t.

SBN event reconstruction: MC Study (SBND)

Working on neutrino energy reconstruction improvements; cosmic rejection improvements, combining TPC, Photon Detection System (PDS) and CRT info into a multivariate analysis. Contemplating reconstruction area related to commissioning, PDS reconstruction.

TPC calibration and simulation working group

Experience gained with ICARUS commissioning used to improve signal processing and detector modeling in the present data and MC production.

Several effects have been identified with a view to precisely correct the m on the longer term in ICARUS. Detector systematics will be evaluated starting from residual differences after the corrections for the different effects after the tuning of the detector modeling.

Comments/Questions:

Review of the slide on computing resources. Bullet on “unsustainable for target production goals unless our disk allocation increases to hole samples at intermediate steps.” There is a bottle-neck

in handling the data. Are we getting favorable responses from Computing on how we'll do things differently and are they going to be able to handle this in the future? Wes Ketchum is involved in this task. Will need to bring up with Analysis Infrastructure group. D. Gibin said we are trying to reduce the size of the data at the very beginning.

Last agenda item:

Discussion about this meeting series, SBN OB. Have been holding for just over 4 years and the landscape has changed. Have a fully functioning SBN IB. Group was created and charged by the lab Director. Now we have a new Director.

S. Brice is asking for feedback. Has the group filled its function? Does it have a role indefinitely? What is useful for the group?

O. Palamara said she, D. Schmitz, B. Wilson, A. Guglielmi and C. Rubbia met with Lia Meringa to discuss the SBN program and mentioned this meeting. O. Palamara's opinion is that it has been very useful, and a natural ending would be when SBND is completed. Everyone agreed the status updates are useful. Would be good to bring up at next SBN IB meeting and bring up a proposal.

M. Shaevitz said there is a use for having an Oversight committee, but not this committee. It should be more closely coupled to leadership of these three programs. Several people agreed regarding natural progression to dissolve when SBND is completed and an alternative committee.

D. Schmitz said there are 2 aspects. One is for decision making in the future and the second is for information sharing. Talks are very valuable where progress is being made. Everyone should see this information on a regular basis, broadcast widely. They're concise but they cover a lot of ground.

S. Brice said maybe that's a different meeting for all SBN collaborators.

B. Wilson said in the beginning, they attempted to get updates from Tech coordinators across both collaborations, but it became too complicated and there were too many meetings. Both collaborations would be very interested in seeing what the other collaboration is doing.

S. Brice is happy to have the spokespeople decide what will work best. He will bring suggestions to L. Meringa.

C. Rubbia – fully agrees with what O. Palamara and said it's very sensible.

The SBN-OB meeting was adjourned.

Next meeting 3 months from now September 9, 2022