

**Minutes of the 10th Meeting of the SBN Oversight Board
(Virtual meeting, Fermilab, September 11, 2020)**

SBN-OB Attendees:

S. Brice (Chair)	D. Schmitz (SBND Co-Spokesperson)
C. Rubbia (ICARUS Spokesperson)	O. Palamara (SBND Co-Spokesperson)
M. Shaevitz (US NSF)	A. Ereditato (Switzerland)
A. Guglielmi (ICARUS)	M. Nessi (CERN)
R. Wilson (US DOE)	

Other Attendees:

P. Wilson (SBN Program Head)	W. Ketchum
J. Saviano (Secretariat)	A. Fava
K. McFarland (IB Chair)	C. Montanari

Action Items from 11 September Meeting

Heads of the infrastructure joint working group, Wes Ketchum and Joseph Zennamo will give a presentation on the numbers and assumptions that went into the projected data volumes and transfer rates.

Introduction and Review of Last Meeting

Steve Brice (Chair), welcomed the members and participants to the Tenth Meeting of the SBN Oversight Board

Dates for next series of meetings have been set. See website for list.

Going forward, there will be a permanent slot in the agenda for ICARUS detector updates. First for commissioning and then for operations updates.

SBN Project Update - P. Wilson

P. Wilson, SBN Program Deputy Coordinator, provided an SBN project update. Slides were presented covering updates on COVID 19- Reopening Status, SBND Tech Progress, Cryogenics, Milestones

There has been a coordinated plan for re-opening across Fermilab that is synched with the State of Illinois and Argonne National Laboratory. All plans need to be approved by DOE. Peter is the planning representative for the Neutrino Division.

Fermilab implemented a 6-stage reopening plan. Essential personnel have been added every 2 weeks since late May. Approximately 800 people working on-site daily. Approx. 1,000 people

total on essential list and roughly 120 are Users. The number of Users is increasing. This number does not include the Users who are living in Fermilab Housing, but not actively going to buildings on-site to work.

Peter discussed the safety protocols currently in place and the additional coordination of work for each facility. There is a point of contact for each facility who's responsible for the daily/weekly work plans and meetings are held weekly to set workload priorities for upcoming week

Fermilab is preparing to bring some key Italian collaborators to site to complete the ICARUS detector commissioning. The lab needs approval from INFN Management and DOE approval at level of Under Secretary to do this.

A discussion was had about the importance of bringing over people from Europe to work, especially on the international experiments and how a 2-week quarantine would be detrimental to progress. Fermilab is working on clarifying rules and figuring out what we really need to do.

SBND Tech Progress – Users are now on essential personnel list. Work has been restarted on the detector at D0, there's progress on fabrication of support components, and we're finishing work on the ATF.

Upcoming: Test installation of mock APA frame, installation of clean tent materials, start of APA installation.

In July, work resumed in Near Detector building; completed leak check of cryostat support structure complete, and fabrication of access stairs + decking. Work on cryostat top cap resumed in August – ramping up at CERN. Membrane cryostat material fabrication on schedule for delivery by Jan 2021. Install contract out for bid at CERN.

Cryogenics: Primary focus continues to be the LAr + LN2 Dewar systems. Cryostat relief valve design is complete, preliminary design of cryogenics control near completion, preparing design/build contract for internal cryogenics (procured through CERN w/assistance by David Montanari from LBNF). Trying to get it complete by November.

Noteworthy milestones: TPC should be ready to move as of June 2021. SBND will be ready to fill with liquid argon by February 2022, PMT is on track, DAQ and electronics readout has made a lot of progress, even during the shutdown. PMT system is on track.

Director's mini review planned for 26 or 27 October. Pre-review briefing 14 or 15 October

ICARUS Commissioning, A. Fava

Angela Fava presented an update on the commissioning of ICARUS. Slides were presented on the purity measurement on the first events collected, installation status, CRT installation, cryogenic commissioning, test for detector activation and next steps.

Installation status: TPC, PMT and DAQ installation activities complete. Hardware for trigger distribution system almost final.

CRT installation: CRT walls progressing, Top CRT modules ready for delivery to US (dates to

be determined).

Cryogenic commissioning: Filling completed on April 19th, liquid recirculation started on April 21st, cryogenic stabilization was completed by the end of May. Steady performance since then.

Slides of sample events presented:

Test for detector activation: Verified stability of Cathode HV and maintained -75kV for 3 days. Smooth ramping, perfectly linear and in agreement with expected resistance. PMTs switched on at nominal voltages, All TPC wires shorted to ground through 50 Ohm terminators-> first induction plane working in semi-collection mode. Data taking with cosmic rays, with random 5Hz trigger.

Detector Activation: TPC wire bias ramped to nominal conditions and cathode HV ramped to nominal -75 kV in 2 steps. Excellent stability.

Next Steps-

Activities remaining to be ready for data taking with BNB in November:

- Calibrations of the PMTs with the laser;
- optimization and calibration of TPC wire signals;
- deployment of the trigger system;
- commissioning of slow controls for components still missing.

Additional activities remaining to be ready for physics:

- installation and commissioning of the remaining parts of the side CRT;
- installation and commissioning of services on top of the detector;
- delivery onsite, installation and commissioning of the top CRT;
- installation of the overburden

Most activities require the presence of onsite experts from Europe.

SBND - O. Palamara

Ornella Palamara, co-Spokesperson, provided an update on the SBN Joint Working Groups

-Slow control still needs to be commissioned.

-SBN Analysis Group - Lot of technical work on updating simulation of light in detector and matching between the track and the flash from the light.

-CRT geometry of the detector - Bottom panel is different from the other panels in the detector because the cryostat design was changed. We are currently using the same panels which are being used for ICARUS

-Creating a strategy of reconstruction so other pieces of our detector can be used. Will remove cosmics in a more effective way at the beginning of the reconstruction.

-Preparing presentation for next PAC meeting in January.

-Starting a large Monte Carlo production for both detectors and will use the following months to

do the analysis on the large data sample.

-The oscillation group is finishing the comparison between different fitters being used for our sensitivity studies.

We want to do a more sophisticated analysis of systematics we have from the cross-sections, detector systematics, etc. On the space charge, we are now able to simulate it and make a reconstruction.

Will start including real data in study the effect of the systematics. Understand a better way to calibrate our detectors, in particular, the TPC part.

Workshops: in July, the focus was on Calorimetry - how to do the calibration and how to do the calorimetric reconstruction. Looking to organize a mini workshop, focusing on studies of overburden on SBN experiment. Invite other experiments (ICARUS, MicroBooNE, SBND).

Update on SBN Institutional Board. K. McFarland

Kevin McFarland, IB Chair provided an update on the SBN Institutional Board. Slides were presented on recent progress and leadership, list of Rules Writing Committees roles and recap of last meeting.

Main function is to make sure there's a clear set of processes in place for handling joint physics results and the presentation of those results.

SBN Rules-writing committee members identified with the exception of one member (17 members in total). Once he has a complete membership proposal to send to the IB, Kevin will ask for approval from them.

Initial website completed. Committee reports and minutes will be kept here

Due to University commitments related to COVID-19, Kevin may not be able to fulfill his duties as needed. He discussed with Steve and is asking for some ideas for a succession plan and stated we should not wait to implement it. Discussion ensued regarding what type of role should be created – Deputy, Chair Apparent, Interim Chair, Vice Chair, etc. Person would need to be fully involved so they can step in immediately if needed. We should clarify what changes could happen and be clear in the intent if an election is called. Kevin said we would most likely request nominations via email. Kevin will take feedback under consideration.

Next IB meeting to be held in October. Topics to be discussed: Reports from rules writing committees, Report from SBN Analysis Group, Membership and authorship in SBN (how do we maintain roles), Permanent rules (by-laws) for SBN IB

Review of the different roles of the Rules Writing Committees and notes from last IB meeting on 29 May

SBN Analysis Infrastructure, W. Ketchum and J. Zennamo

Wes Ketchum and Joseph Zennamo presented updates on the SBN Analysis Infrastructure

Goal is to coordinate and address data and software infrastructure and computing resource needs across SBN to enable SBN program's scientific goals. They work alongside the current SBN working groups, including ICARUS and SBND physics groups, and focus on basic infrastructure on "how" to do things. (The "what to do" is defined by the collaboration and physics analysis groups.) Ours is very technical group which tries to implement the best way to get things done while meeting the needs of the collaborations.

Main focus topics of group: (slides)

1. Release management
2. Production and resource management
3. Simulation software management
4. Analysis software management
5. Beam & "dirt" simulation (Dirt = interactions that take place outside of the volume of the detectors themselves)

Activities of the previous months: (slides)

- Completed transition of SBN repositories from Fermilab redline servers to more widely used "Github," which enables better control of software updates via "pull" requests, making updates easier and more reliable. Everyone in SBN has access to these repositories.
- Assessed and nearing completion of migration to common SBN software dependency.
- Completed assessment and annual presentation of necessary computing resources to Fermilab Computing Resource Scrutiny Group (FCRSG).
- Presented for the first time as a joint SBN effort - comprehensive computing needs for the SBN Program as a whole while also maintaining a separate need for separate detector activities
- Participating in ESNNet review of global networking model and needs
- Establishing data replication to offsite locations
- Coordinating w/working groups on common software improvements
- Developing and testing improved workflows to efficiently use computing and data storage

Baseline computing and data storage needs are high, but we are getting support from FNAL SCD.

Question of whether or not tools are in place to monitor the usage across two collaborations. Wes said some tools are built into the infrastructure in a way that allows for common monitoring. Fermilab has many tools for doing this exact kind of monitoring. Much of the computing needs and data storage needs will be dominated by common major production of simulation data and the reconstruction of simulated and real data.

Analysis Needs: will not be heavy with data storage and shouldn't compete with major data storage. Many monitoring pages already exist and there will be dedicated checks. There will be a 3-year usage plan and there is an annual review of what the requested usage was versus what was

actually used. Kevin commented we should think about how to communicate the usage on demand so it's easy to see what's dominating the usage at any given time.

Developing and testing improved workflow to efficiently use computing and data storage. It will continue to be an ongoing effort. Working with SBN DAQ and ICARUS software to prepare for detector coming into operation.

Reviewed slides for anticipated “nearline” workflow and the status of “nearline” data management workflow.

- Commissioning data currently being transferred from SBN-FD to central storage
- Automated nearline processing running on new data as it arrives. Made available for offline use.
- Final configurations of workflow and “Reco 1 file” production awaits further commissioning and analysis of data

There will be no reduction of data size in transfer, working on automated transfer of data. In the future, goal is to output a smaller file (Reco 1) that can be used as an input for a high-level reconstruction – basically a translation of raw data to a calibrated and condensed view of the detector (of where we have signal). (Raw data will always be kept)

Carlo asked – how did we calculate the amount of storage that will be needed for ICARUS. Due to the fact that almost all ICARUS personnel are in Italy, we need to guarantee that the transfer of data is stored efficiently, quickly, and on time. Also, is CERN going to contribute to the analysis data? Marzio said yes, both students and staff will contribute.

2021 Production Campaign (slide)

- Working with SBN Working groups to prepare and execute a major simulation and data analysis campaign. Production intended for Summer 2021, should start January 2021

Sharing of data software and resources (slide)

- Working to further develop tools and documentation that ensure access to data and software across SBN

Discussion on event scanning with Carlo, Wes and Ornella– Bubble chamber physics was done by looking at events. ICARUS and SBN are liquid argon detectors which are very close to behavior of bubble chamber. Are you assuming to do everything automatically without seeing an event or does it need to be scanned visually by someone who decides what to do next? Which is a fraction that is done automatically, and which fraction is done by looking at events? Due to the number and volume of events, we must have automated tools for doing basic reconstruction and event selection. The tools do allow for the automatic scanning for every event.

All the raw data will be available for scanning. We need to do screening to eliminate background events and a smaller sample of events to be analyzed.

The SBN-OB meeting was adjourned.

Next meeting 11, December 2020