Fermilab **ENERGY** Office of Science



ICARUS Operation report – Dec 2022

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Current Detector Status

The ICARUS detector is fully operational and steadily collecting neutrino beam data with both BNB and NuMI beams.





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Electron Lifetime update

- The electron lifetime on the ICARUS detector is constantly increasing in both cryostats and is currently at 3.3 ms in the East module and 5.5 ms in the West one.
- The West cryo, with the filters regenerated during the summer and the pump repaired, is improving at a much faster pace than the East one and has reached much higher value than before the intervention (2.5 ms).
- The automatic venting (4 times a day in both cryostat) proceeds smoothly. We are considering reducing its frequency.
- The Cryo system is very stable overall





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TPC coherent noise reduction campaign

In November, TPC electronics experts from Italy installed Chebyshev low-pass filter on several TPC readout boards with the intent to reduce the observed coherent noise . This work was very successful .



The fig shows the overall reduction of 0.6 ADC in the readout boards in the corner minicrate EE01M. Smaller reductions were observed in other minicrates but an overall improvement was achieved.

The installation of filters on the remaining readout boards on the corner chimneys will be completed when experts return here in one week.



Other activities

• **Collection of Laser runs** for PMT timing calibration was completed collecting data for all 360 PMTs.

• **PMT gain calibration** are underway. Once completed the detector will be fully calibrated and ready for Run 2.

• A set of **special trigger runs** have been collected in the past weeks, testing lower PMT trigger thresholds, overlapping trigger windows and various settings of the Majority trigger requirement in the off-spill gate to check trigger efficiencies and running stability. MCR kindly accommodated our requests for higher rep rate (up to 4Hz) for these tests.

• **Grounding** of one section of the **cable trays** (on the EE TPC) was completed. A better grounding may improve the noise level in the TPC (to be determined by analyzing data collected after the work was completed).





Ongoing or future activities

•Calibration studies with cosmic rays with 4Hz random trigger, when beam is not available

•Study of performances of the additional PMT Adders trigger system to be included soon in the overall trigger requirements

•Integration of the bottom CRT system in the full ICARUS DAQ: data can be acquired standalone but work is ongoing to integrate the system into the full ICARUS DAQ

•As mentioned, **finish the installation of the noise reduction filters** in more TPC readout boards, to start in about a week.

Overall the ICARUS detector is in a great shape and ready to start Run 2 soon





Thank you

