

SBND Status

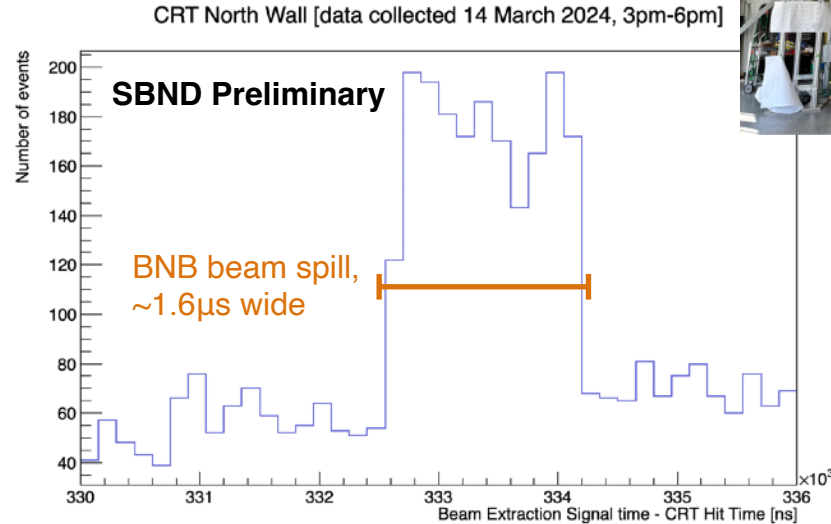
Michelle Stancari & [Lauren Yates](#)
AD Weekly Friday 09:00 Meeting
May 17, 2024



BNB in the SBND Cosmic Ray Tagger

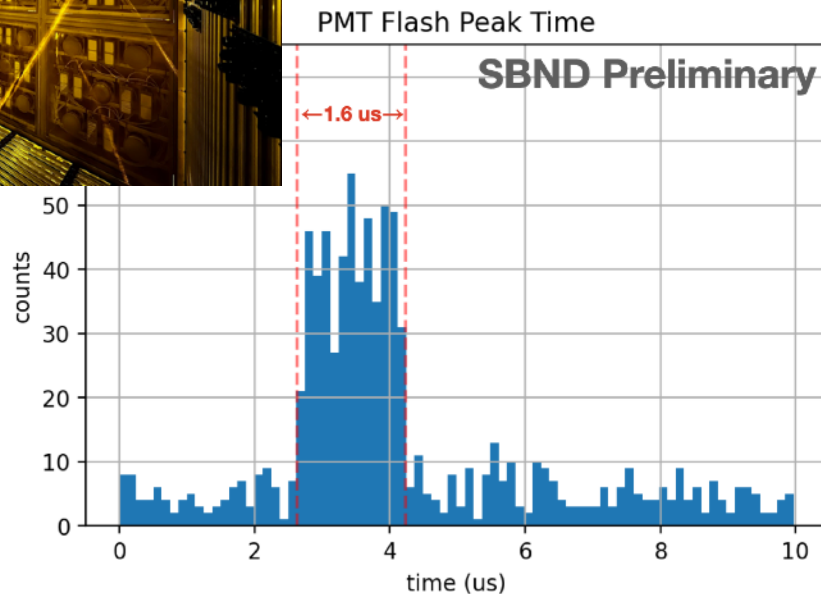


- Cosmic ray tagger (CRT) consists of plastic scintillator panels that surround the detector, with 4 of 7 walls currently installed
- Have observed beam as an excess of CRT activity in-time with the BNB beam spill ($\sim 333\mu\text{s}$ after the $\$1\text{D}$ -gated $\$1\text{F}$)



BNB in the SBND Photon Detection System (PDS)

- The photon detection system (PDS) includes 120 PMTs inside the cryostat
- Have observed beam as an excess of PMT flashes in-time with the BNB spill
- PMT readout was a 10 μ s-wide window initiated using beam signals from our MFTU, sent through the experiment's trigger system
- Plot on the right contains about 40min of beam data from May 8th





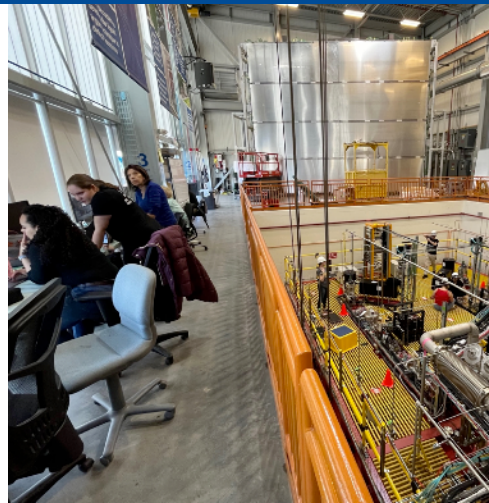
Other Detector Commissioning Activities

- Follow-up studies of the synchronization of the CRT and PDS systems with the beam are planned
- Work to incorporate information related to exposure accounting (i.e. protons on target) into experiment data stream is still needed, and subsequent validation with beam data is critical
- Testing of experiment trigger configuration with beam-induced activity in the detector is important
- Thorough testing of the data acquisition (DAQ) system with beam triggers is also important
- Expect to continue using BNB beam for these activities until the summer shutdown
- Commissioning of other systems, including the TPC HV, are ongoing in parallel with this work
 - A special thank you to members of the AD low & pulsed power HV group, who have provided assistance with the SBND TPC HV distribution system
- BNB down-time or changes in the beam configuration may affect our activities, and it is helpful to be informed any work that will affect BNB delivery (sbnd_ops_managers@listserv.fnal.gov)
- We currently have no specific requests in terms of BNB beam intensity

Thank you!



- The BNB beam that has been delivered in the last couple of months has been invaluable for commissioning aspects of the SBND detector, DAQ, and trigger systems
- We appreciate the efforts from everyone in AD to provide beam and to keep us informed



Additional Slides



SBND Detector Overview (1 of 2)

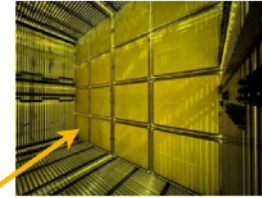


LArTPC

Active mass is 112 t
Active volume is 4x4x5 m³



Cold Electronics (in LAr)
pre-amplify and digitize
TPC wire signals

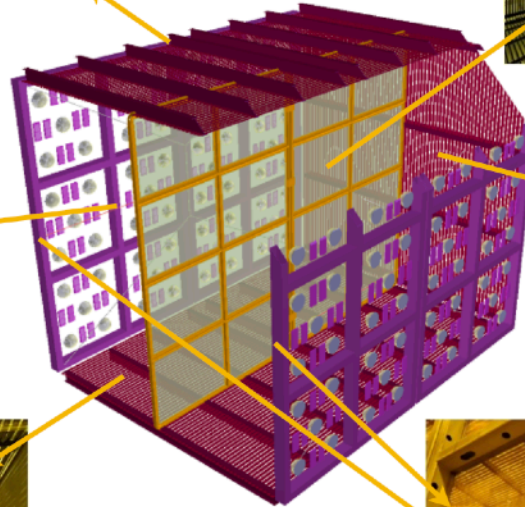


Cathode Plane at -100 kV
divides the detector into two
drift volumes

Drift distance is 2 m,
max. drift time is ~1.28 ms

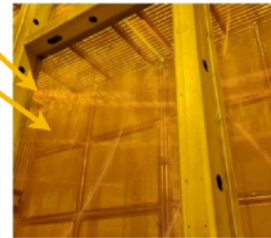


TPC East



TPC West

Field Cage wraps around
the two TPCs to step down
the voltage and ensure a uniform
electric field of 500 V/cm



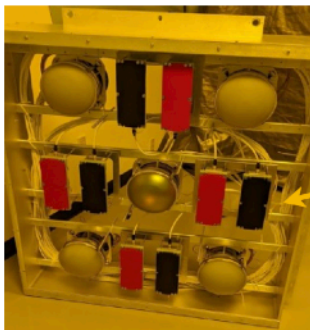
Anode Plane on either side,
each with three wire planes
with 3 mm wire spacing and
different orientation per plane

Total of 11,260 wires

SBND Detector Overview (2 of 2)



Photon Detection System

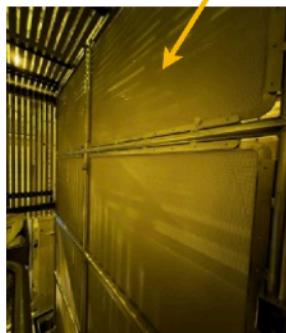


24 PDS Boxes

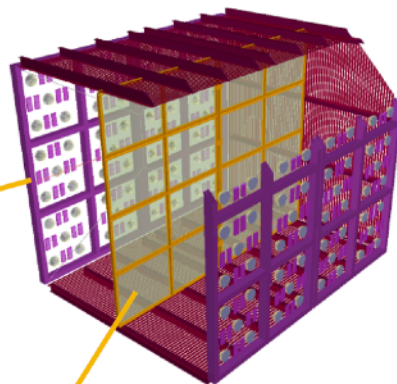
behind the anode wire planes

5×24 = **120 8" PMTs**
80% TPB-coated,
20% uncoated

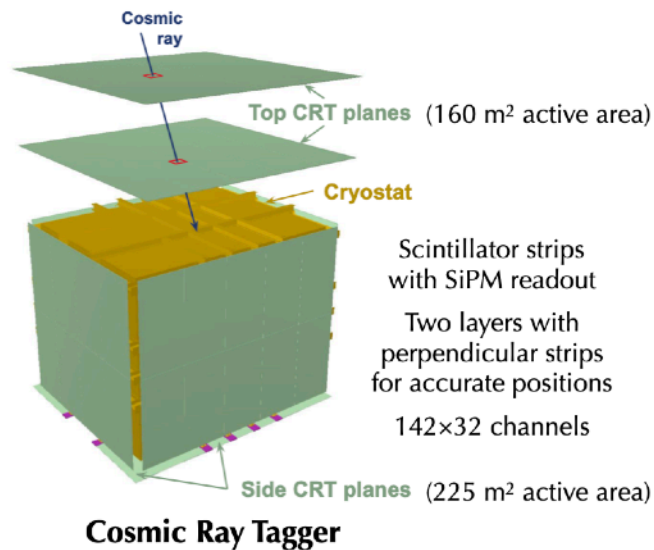
8×24 = **192 X-ARAPUCAs**
half with wavelength-shifting



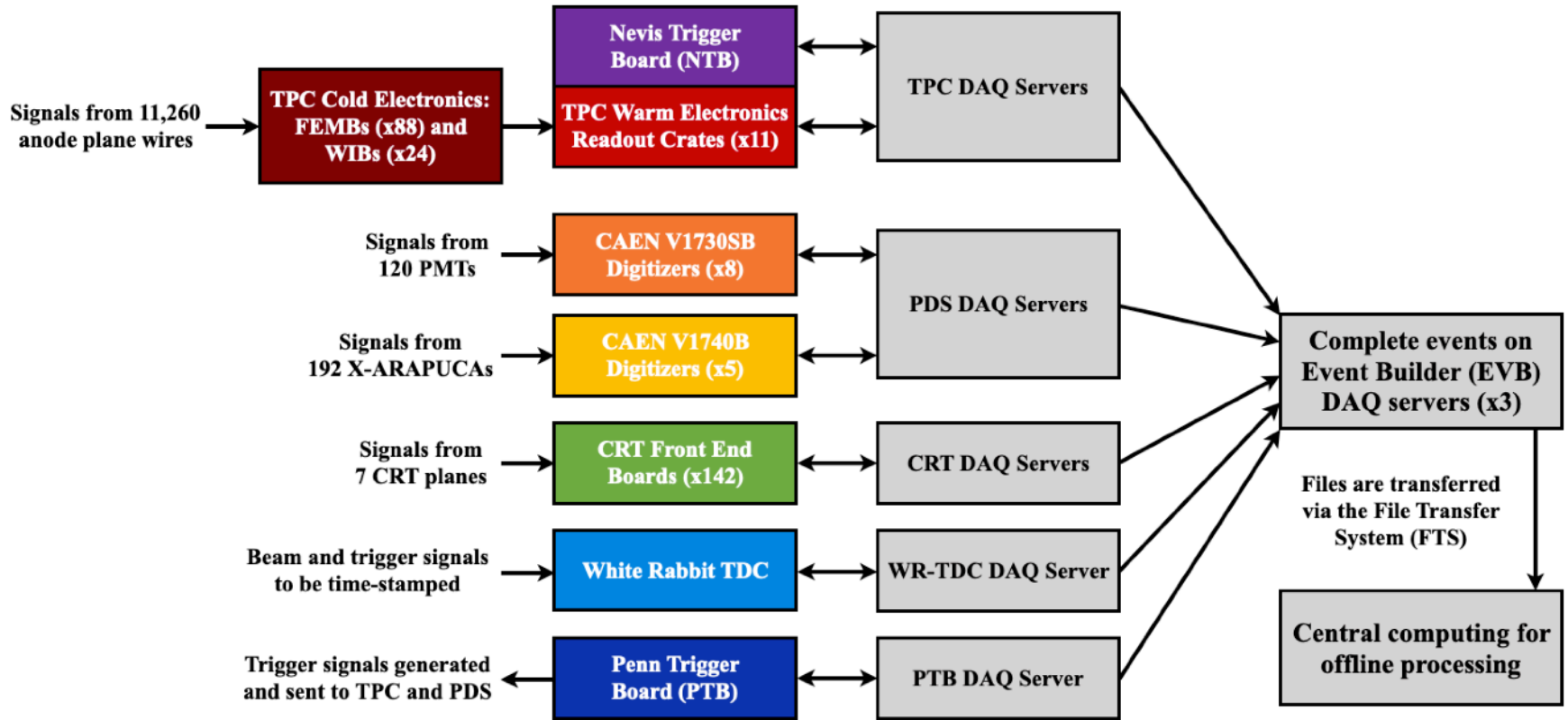
Cathode Plane with
TPB-coated reflective foils
mounted behind mesh panels



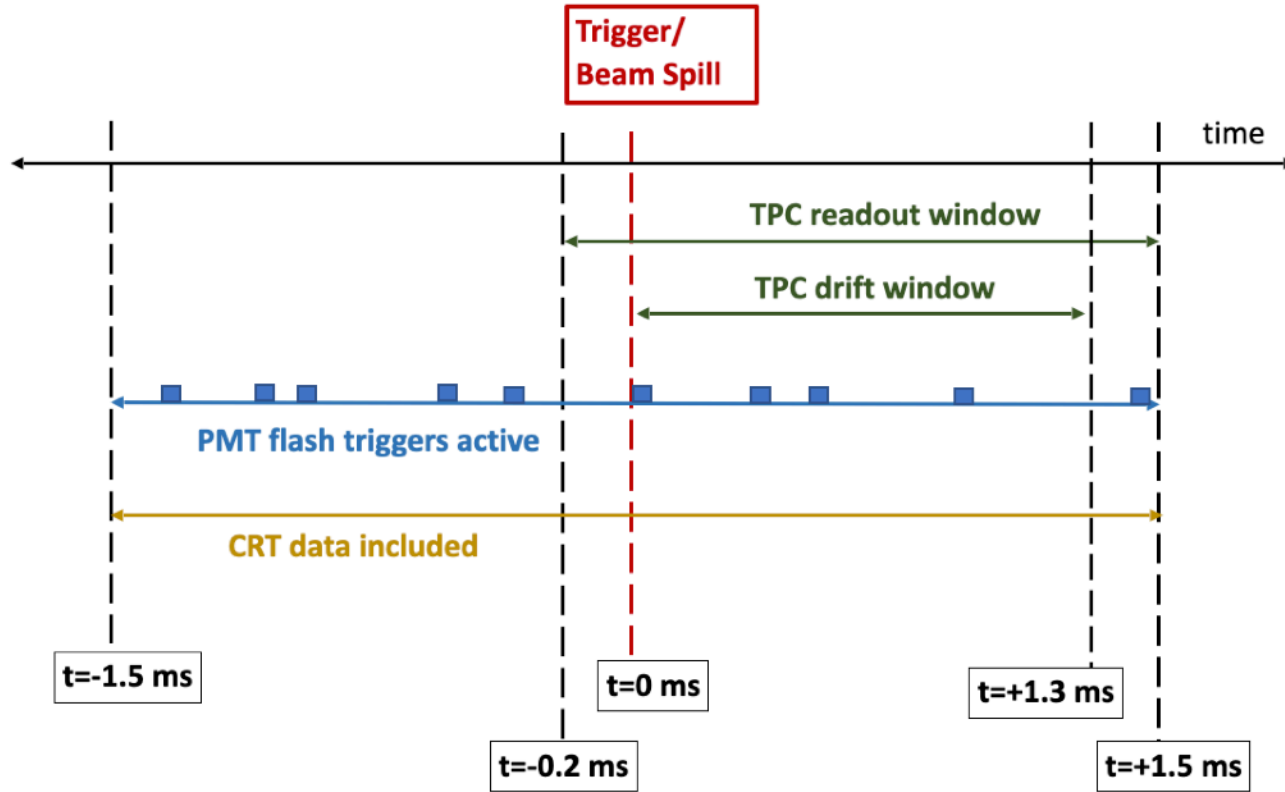
Trigger System



SBND DAQ Schematic



SBND Event Schematic



SBND Event Schematic (Beam Events)

