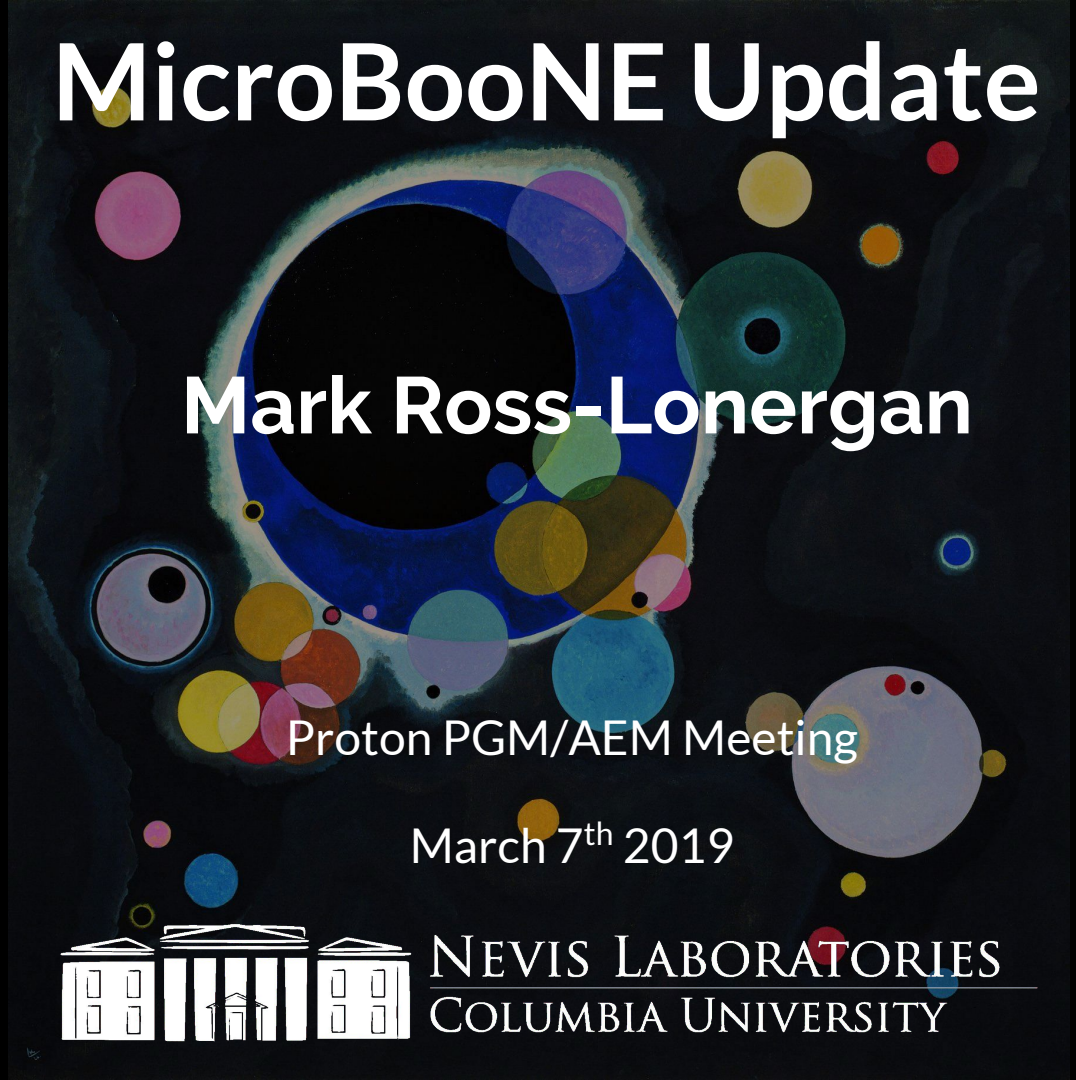
MicroBooNE Update



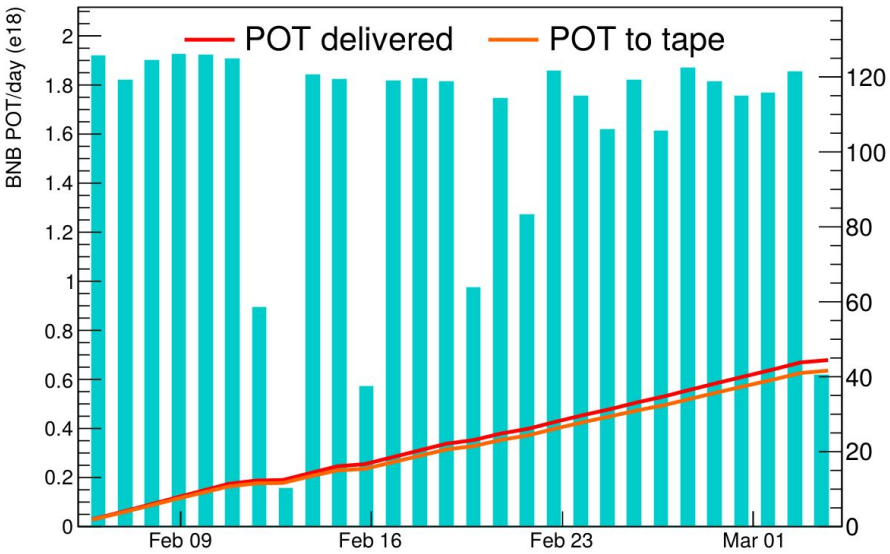
Mark Ross-Lonergan

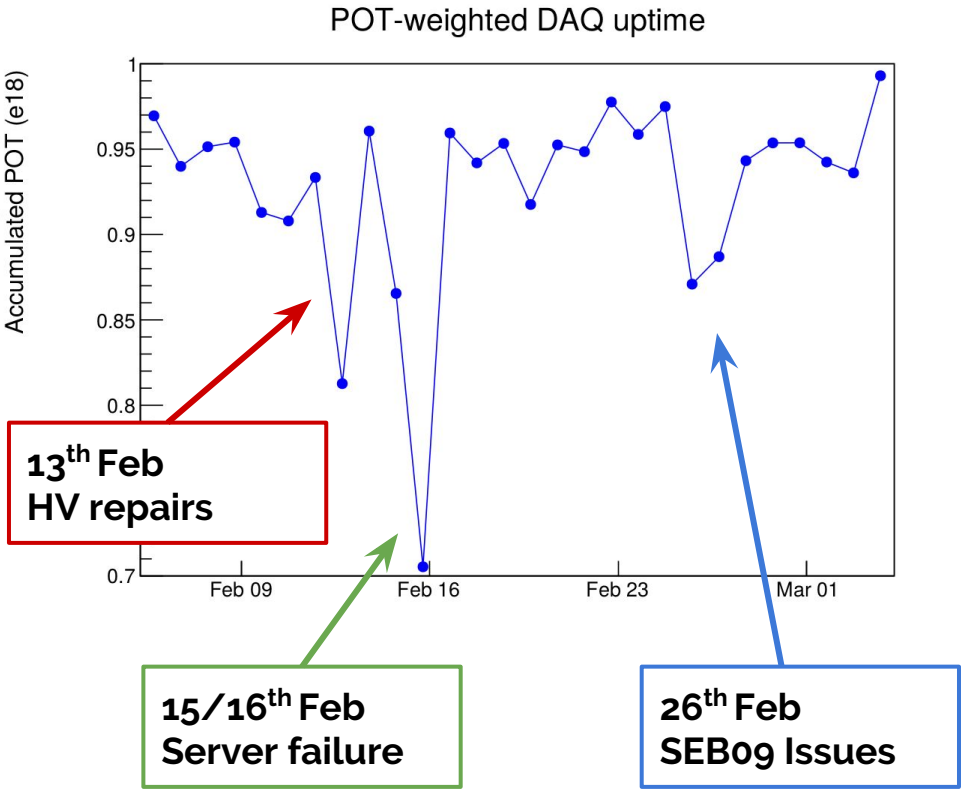
Proton PGM/AEM Meeting

March 7th 2019

Nevis Laboratories
Columbia University

DAQ Uptime





POT delivered since 7th Feb: 4.44 e19

POT recorded on tape: 4.17 e19

Fraction Recorded: 93.6%

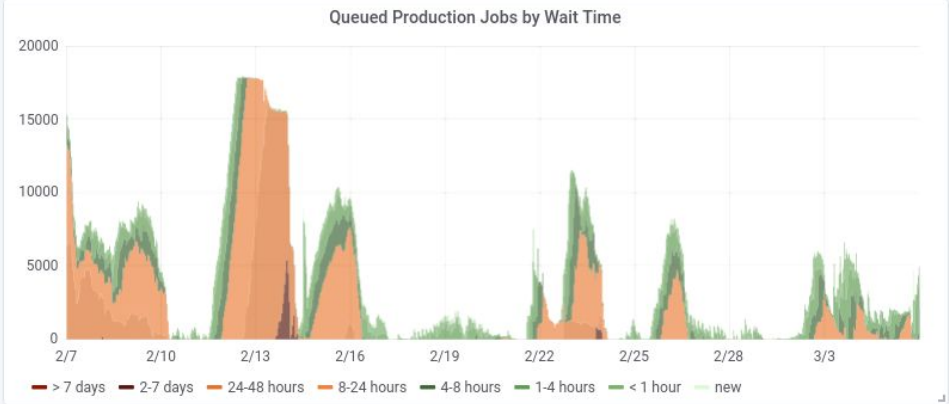
Computing Resources

Average Jobs Running Concurrently

1760

Average Time Spent Waiting in Queue (Production)

6.45 hour



New Data Cataloged

7.3 TB

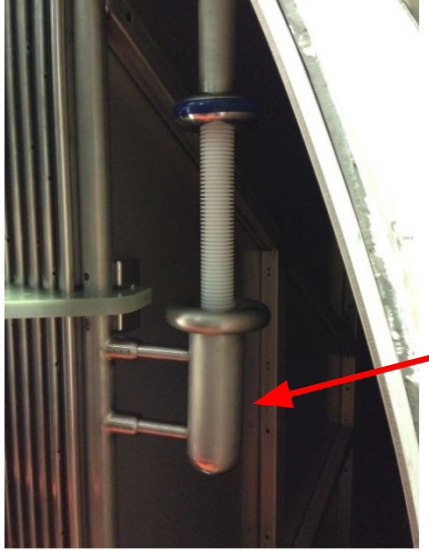
Total Data Cataloged

18.3 PB

Lessons Learned from HV instabilities (I)

After heating failure at LArTF during the middle of the polar vortex, MicroBooNE began experiencing large high voltage instabilities which remained once temperatures returned back to normal.

Initial investigation on the warm HV connection and power supply did not indicate an issue (performed a dry nitrogen purge, cleaning HV contact point)



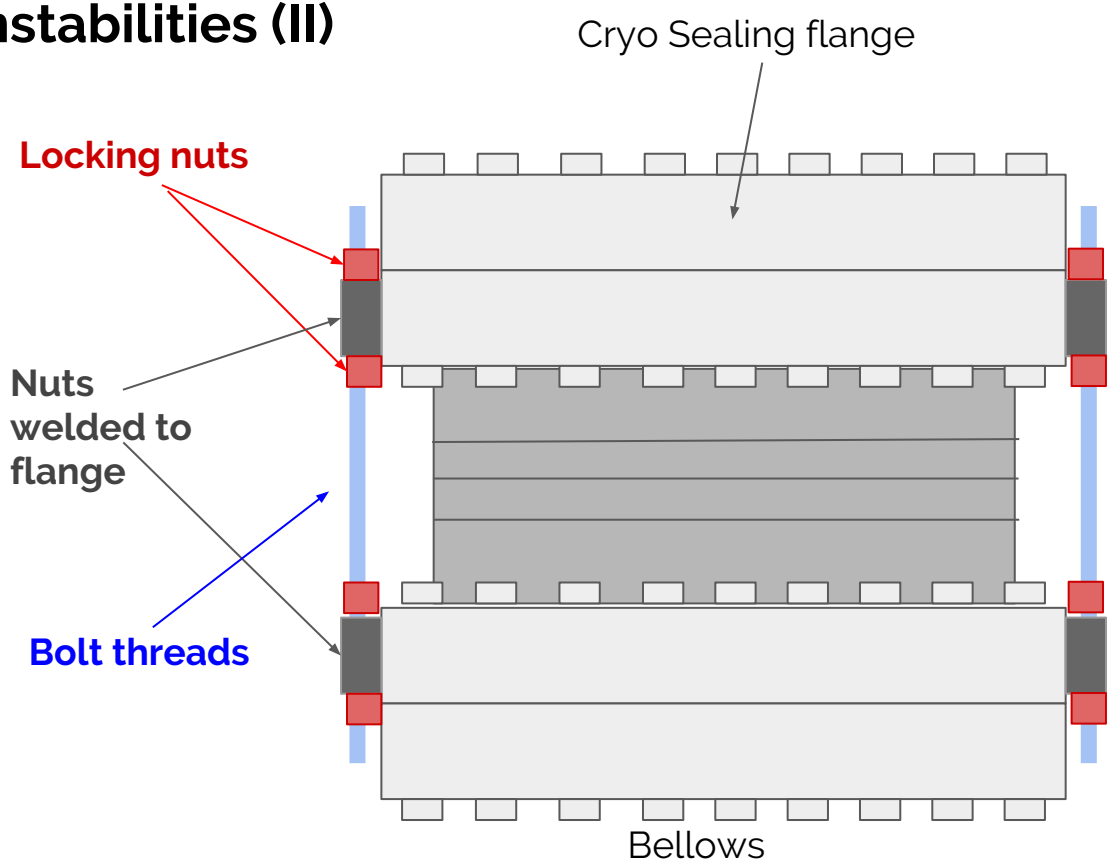
HV connection at the Cathode cup inside the cryostat

Developed a procedure to use the nearby PMT power supply instead of the usual 70kV Glassman supply. The PMT supply has **nano-amp** precision up to ~1750V, which allowed us to directly measure, in real time, the total resistance of the field cage, whilst tracking all data in our slow-monitoring system for later analysis.

This can be **deployed very quickly**, and is **minimally invasive** to the high voltage feedthrough.

With this system in place, and having verified the connection in the warm side of the HV feedthrough, we identified that the issue was at the **connection in the cold argon at the cathode cup**.

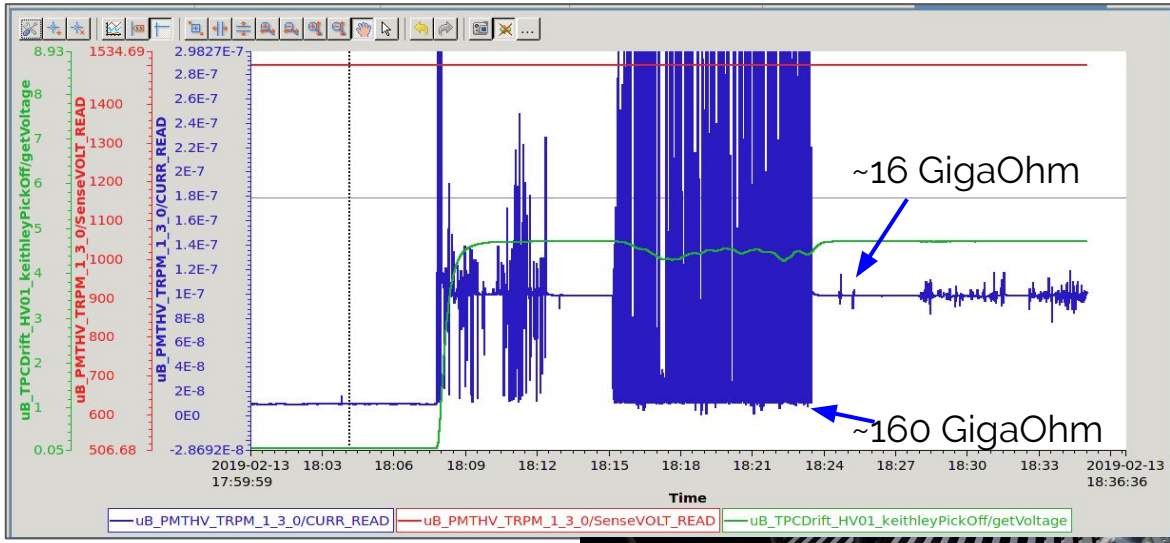
Lessons Learned from HV instabilities (II)



Ability to manipulate cold cathode contact via bellows is crucial!

Lessons Learned (III)

Fully operational with **stable HV** and taking **beam on 13th Feb**.
Unlike in previous HV instability periods where the exact cause of the improvement was not understood well, we now have:



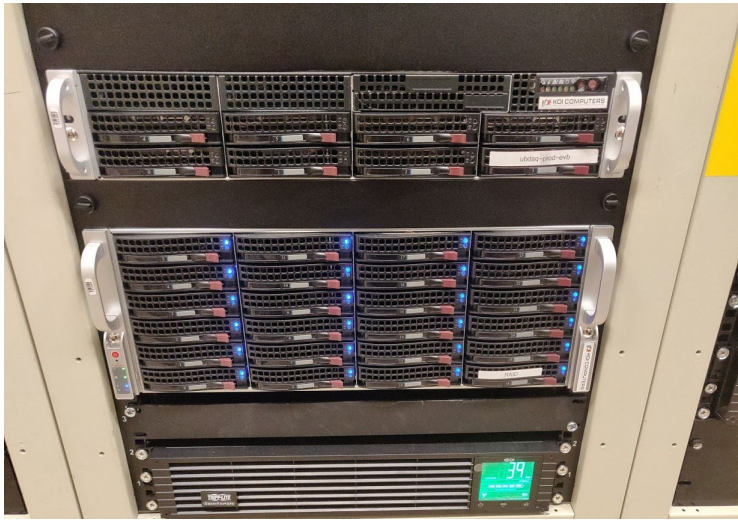
- **100% correlation** between bellow manipulation and HV instabilities
- Good record of exact steps taken, tracking improvement in real time, with data saved to our monitoring system
- A **detailed step-by-step guide** in place to put quickly assemble monitoring system and how to fix such issues rapidly if they arise in the future.

The exact mechanism by which the rapid drop in building temperature caused a shift in the cathode connection is unknown.

Primary server “ubdaq-prod-evb” failure

At ~11:30pm on Friday 15th our **primary eventbuilding server (ubdaq-prod-evb) failed.** This was a new machine, installed only last summer and still under warranty.

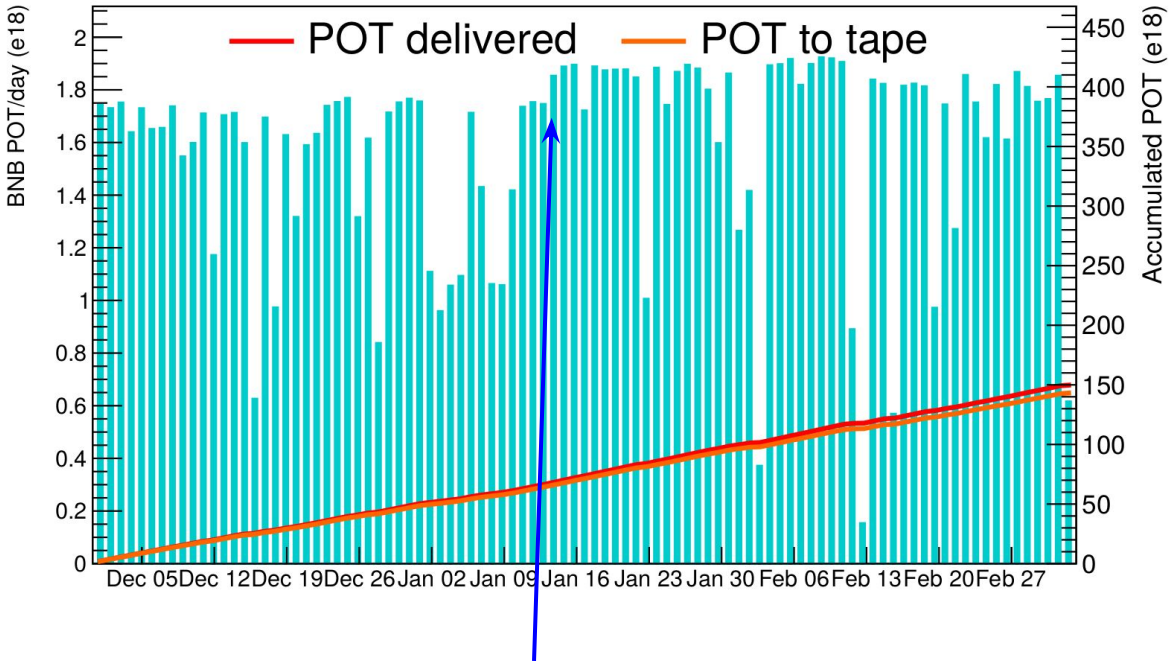
Remote shifter was immediately disconnected from our Slow-Mon and DAQ VNC and contacted the run-co.



- Farhan Ahmed from SLAM met the run-co around 1:30am and **switched over to our backup server** “ubdaq-prod-evb2”. This was a backup from the summer 2018 shutdown.
- Due to driver updates at the end of the summer, exact working configuration was not known and DAQ was down for ~18 hours until system was brought back into fully working state
- The following monday morning, KOI computers replaced the motherboard and on wednesday 20th Feb we switched back during planned beam downtime. **Updated and improved our “DAQ server failure plan”**

Huge thanks to **Bonnie King** and **Farhan Ahmed** from SLAM as well as **Gennadiy Lukhanin** for all their help

Bunch Rotation



Bunch Rotation Begins
Jan 14th 2019

Almost two months of data taking with bunch rotation turned on in the Booster Neutrino Beam.

MicroBooNE is *not* sensitive to the temporal spread in the individual bunches

However, the increase in intensity allowed by the bunch-rotation has been observable in an average POT per day **increase of by 7-9%** on days where everything else was optimal.