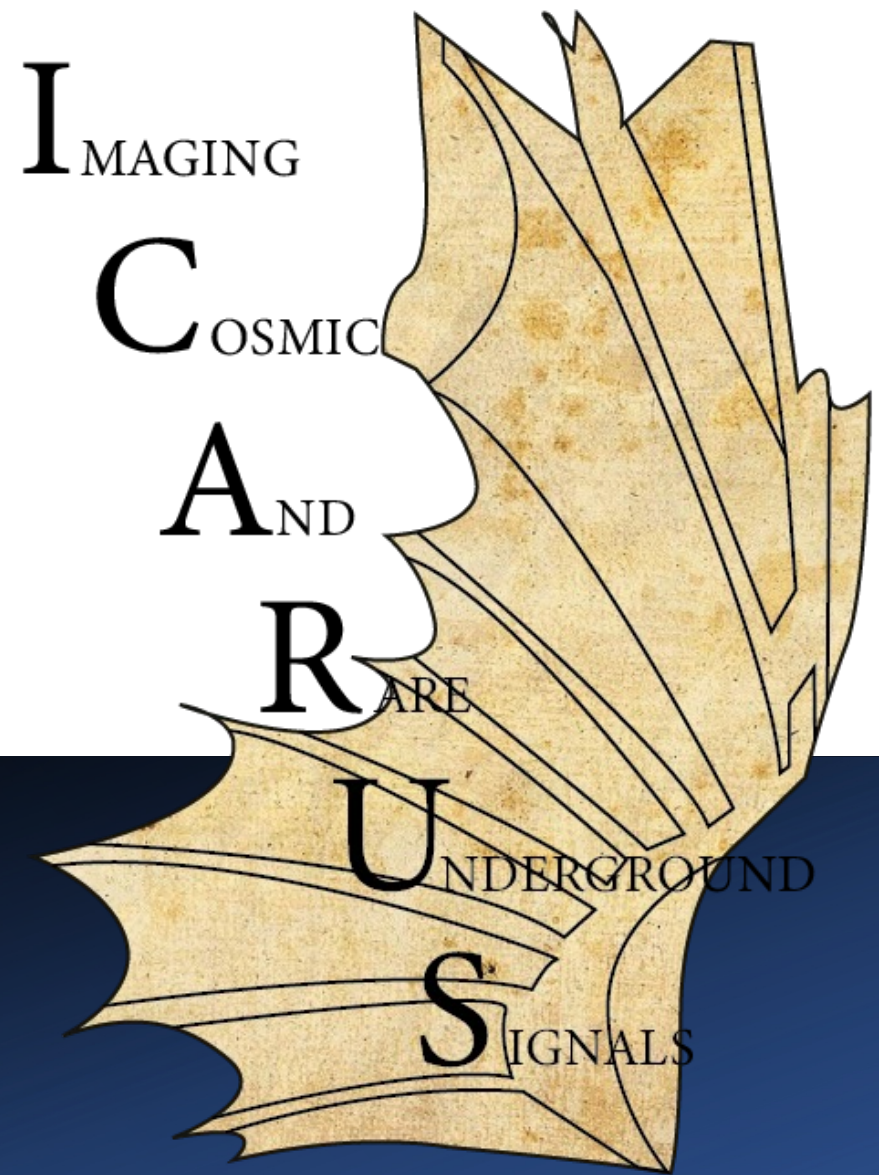


# ICARUS Operation Report (October 2022)

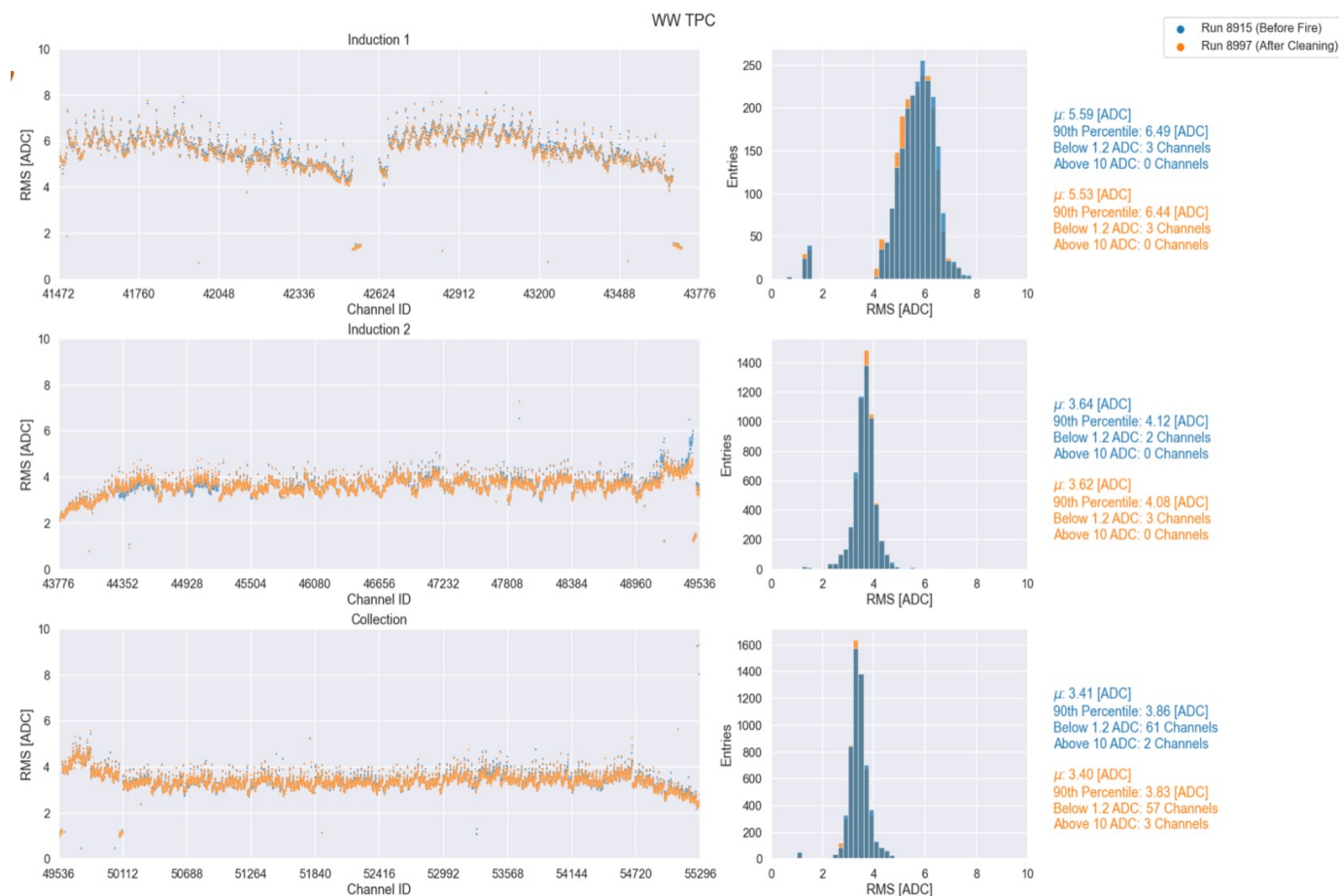
Filippo Varanini (INFN - Padova)

Donatella Torretta (FNAL)



# Recovery after the fire

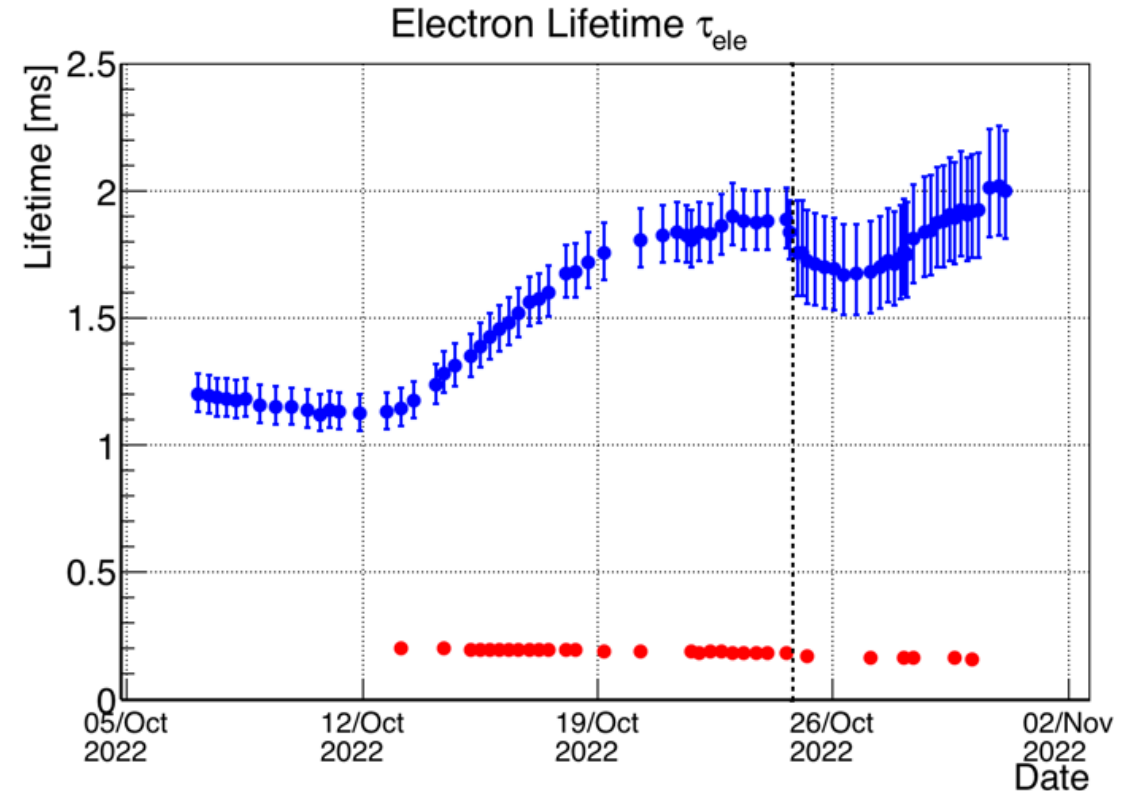
- Clean-up of the TPC electronics and power supplies was concluded on October 13
- TPC noise appears compatible (or slightly lower) with the conditions before the fire
- Data-taking was restarted with the full detector on October 14
- Insulation in the West filter box (where the fire happened) was re-installed, and the box was closed on October 19
- Some wiring connected to the West Argon pump was found in bad conditions. Repair/replacement is ongoing



*Noise before the fire*  
*Noise after the fire*

# Cryogenics

- Electron lifetime in the East cryostat is improving – currently at  $\sim 2$  ms
- Some issues with automatic venting were successfully solved
- Physics-quality data taking can start at  $\sim 2.5$  ms – possibly next week
- The Argon recirculation pump for the West module was at the vendor for repairs – on the way back right now
- Without recirculation, West module electron lifetime is very low ( $\sim 0.2$  ms)
- When the pump is back, it will take a few weeks to establish an acceptable liquid Argon purity
- Physics operations with the West module will be possible in late November/early December



*East module*  
*West module*

# Current status

- During October, the installation of the PMT adders was finalized
- Characterization of their signals is ongoing
- RWM signals from both BNB and NuMI were also distributed to the trigger system
  
- When BNB was switched on on October 17, data-taking was restarted with the same trigger used for Physics Run 1 (based on PMT majority in coincidence with beam gate)
- Beam data-taking proved stable and without DAQ issues (at least for ~half intensity)
- Last week and this one are devoted to detector calibration runs
  - Wire plane transparency studies (with lower electric field: 350 V/cm instead of 500) in order to study the uniformity of the detector energy response
  - PMT energy and time calibration with lasers
  - Upgrades to the trigger: full information on the event and POT encoded in trigger fragments
  - Upgrades to the DAQ: better log outputs and fixes to sporadic run crashes
  - Reduction of the TPC coherent noise

# Towards physics Run 2

- ICARUS recovered from the fire in September without any permanent damage
- However, the clean-up and recovery process significantly delayed other activities during late September and October
- Despite this, most of the tests and upgrades planned at the beginning of the summer shutdown were performed:
  - **Calibration studies with cosmic rays:** a high-statistics map of the energy response of the TPC in all 3 planes was produced
  - **Installation of RWM (both BNB and NuMI) signals distribution to the trigger system**
  - **Finished installation of PMT address boards** and study of their performances
  - **Operation of the bottom CRT system:** data can be acquired standalone. The system still has to be integrated into the full ICARUS DAQ
  - **Improvement of the trigger and DAQ system:** several improvements over the summer, allowing to run high-rate (4Hz) calibration. Further upgrades are currently being introduced
- The detector is ready for beam, except for the electron lifetime:
  - **East module** is rapidly improving
  - **West module** is being delayed by vendor issues.

***Looking forward to Physics Run 2 as soon as possible!***