

# Electronics validation analysis

## News from Genoa

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# Our goals

- **Simulated data:** neutrino interactions in SAND during a spill time  
(/storage/gpfs\_data/neutrino/SAND/PRODUCTIONS/PROD/SAND\_opt3\_STT1\_SPILL)
- **Geometry:** 53 cameras, 1024 channels (2x2 mm<sup>2</sup> each)
- We will simulate photon scintillation emission in LAr and in Xenon doped LAr
- **Simulation output:** position and time of photons detected by each camera  
(quantum efficiency included)
- **Goal:** we want to select most critical and significative samples and validate the architecture on those samples

# Selected samples

1. Events that need a high number of integration windows for some channels



2. Events with the lowest time between the interaction time\* and the previous detected photon



# Electronics validation

1. For validating the architecture with 2 Wilkinson and conversion time of 40-50 ns

2. Which amount of channels per interactions have not the right  $t_0$ , due to previous photons

\*The interaction time is given by true information from MonteCarlo, if a peak of at least 3 photons is detected in the channel

# Selected samples

3. Channels with the highest number of photons within one  $\tau$  (signal decay constant) from the interaction time\*

4. Events with the highest number of photons within an integration window

# Electronics validation

3. Is the electronics capable of detecting such a high number of photons in a small time window?

4. For optimizing/validating the dynamic range

\*The interaction time is given by true information from MonteCarlo, if a peak of at least 3 photons is detected in the channel

# Work in progress

- We are writing a Python code ([https://baltig.infn.it/dune/sand-optical/electronics\\_validation.git](https://baltig.infn.it/dune/sand-optical/electronics_validation.git)) that:
  1. selects the events accordingly to one of the previous criteria ( $O(100)$  samples for each case)
  2. runs the architecture simulation provided by the Torino group on the samples
  3. checks when the reconstruction requirements are satisfied varying the electronics parameters
- Estimated time to completion: 4 weeks