

50L setup: status and plans

F. Barao (Lisbon U. / LIP)

Nov 30th, 2023

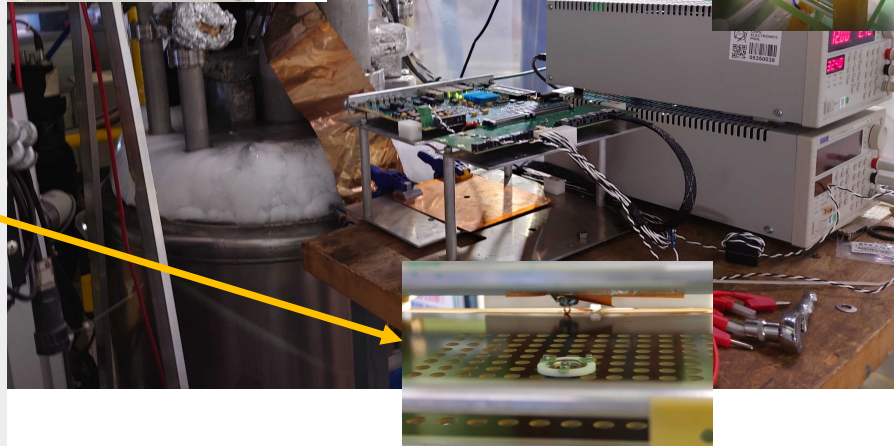
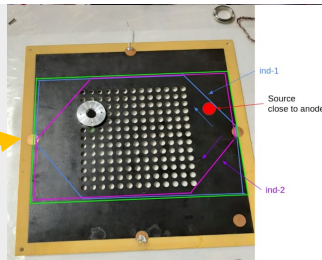
50L: status

50L data taking **till Aug 2023**

- two Bi sources, using old FEMB card
- half of collection channels with low gain

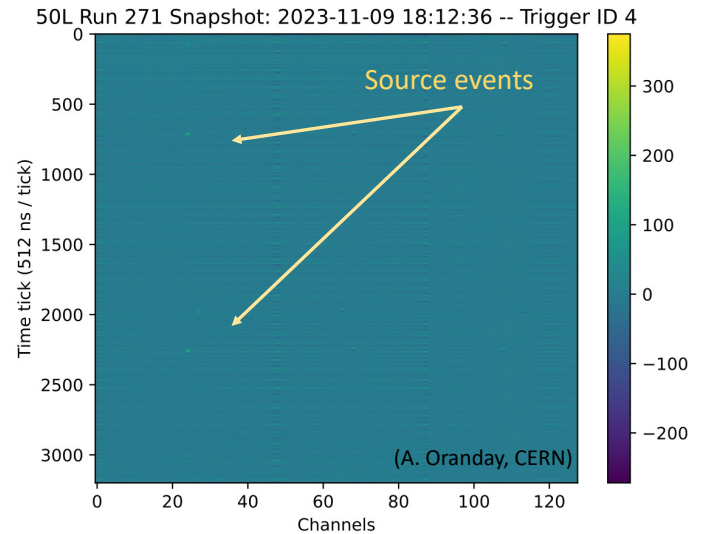
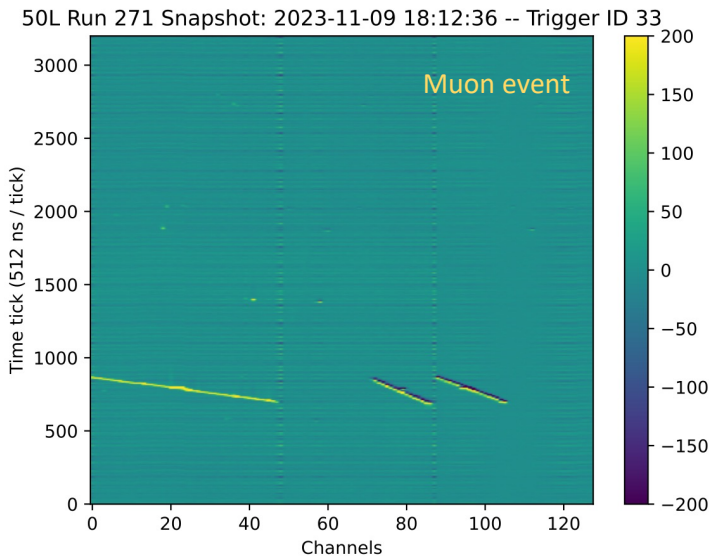
from Aug till Nov 2023

- one Bi source data placed in the center of the cathode
- new FEMB card
- DUNE-DAQ software readout used (HD5 format)
trigger primitives
- stopped from the Nov 15th



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50L: status (cont.)



Bi source at cathode: electron charge drift time $\sim 50\text{cm}/0.16\text{ cm}/\mu\text{s} = 312\ \mu\text{sec}$
Data is recorded in time frames of ~ 3200 ticks of 512 ns \Rightarrow time window: 1.6 ms (many events)
Random Trigger: 10 Hz \Rightarrow source events ~ 300 /s (975 keV electrons from 3- \rightarrow 1 decay: ~ 30 /s)

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50L: status (cont.)

50L data taking

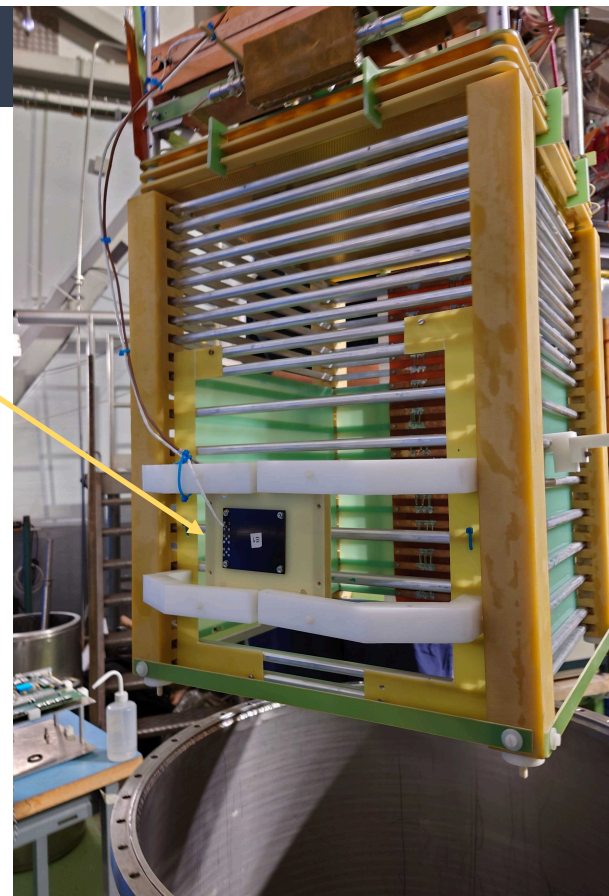
Resuming before Christmas

- waiting for new ARAPUCA modules which should be at CERN beginning of December
- installation of one (or two) high rate (37 KBq) Bi sources

test LAr purity measurement with new electronics

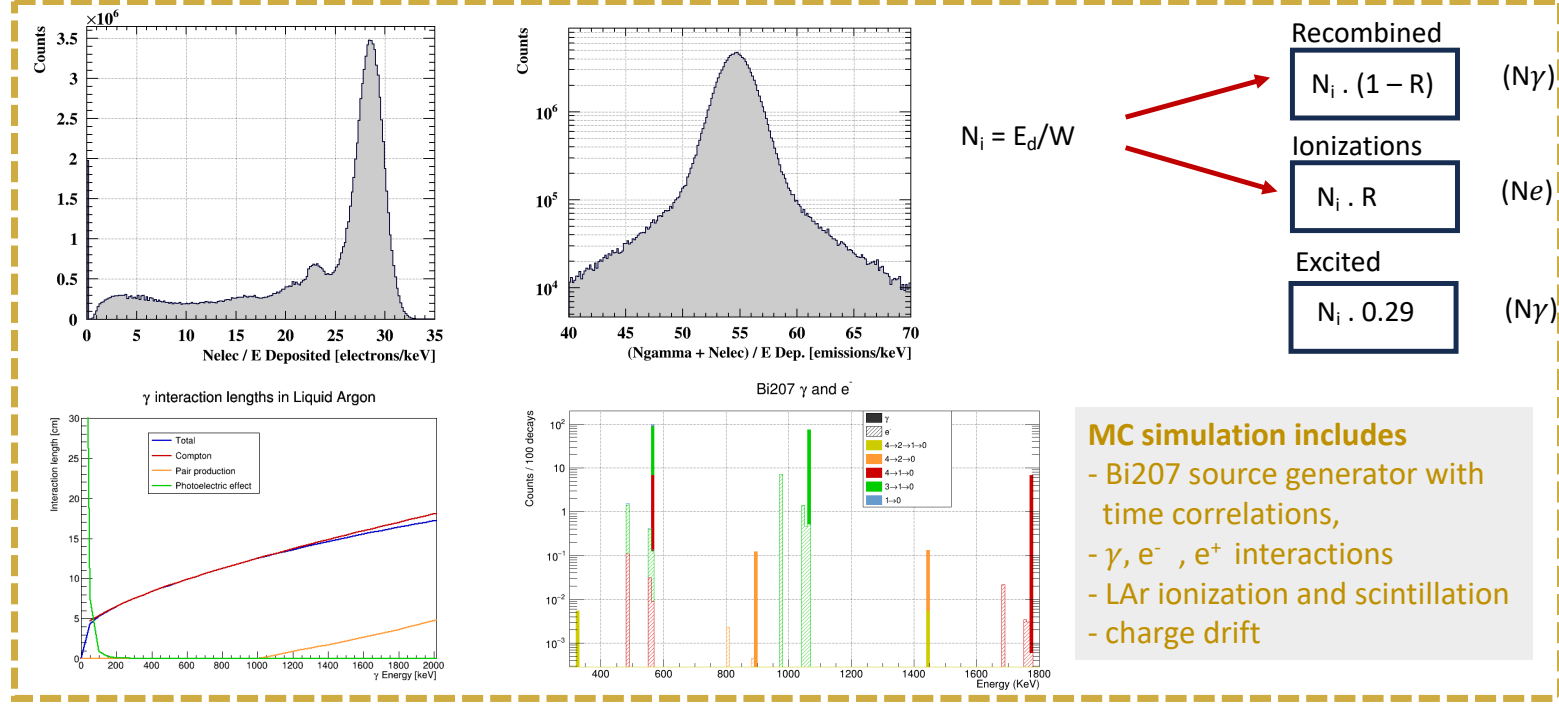
Old FEMB data analysis: M. Fani (Los Alamos), J. Capó (Valência), F. Barao (Lisbon)

Analysis of new FEMB data being done at CERN (A. Oranday, F. Pietropaolo, advanced) and at Lisbon/LIP (F. Barao + student, starting)



50L: Bi207 simulation

Simulation of Bi207 source: Luke Saunders (Boston U.), F. Barao, J. Antunes + students (Lisbon U./LIP)

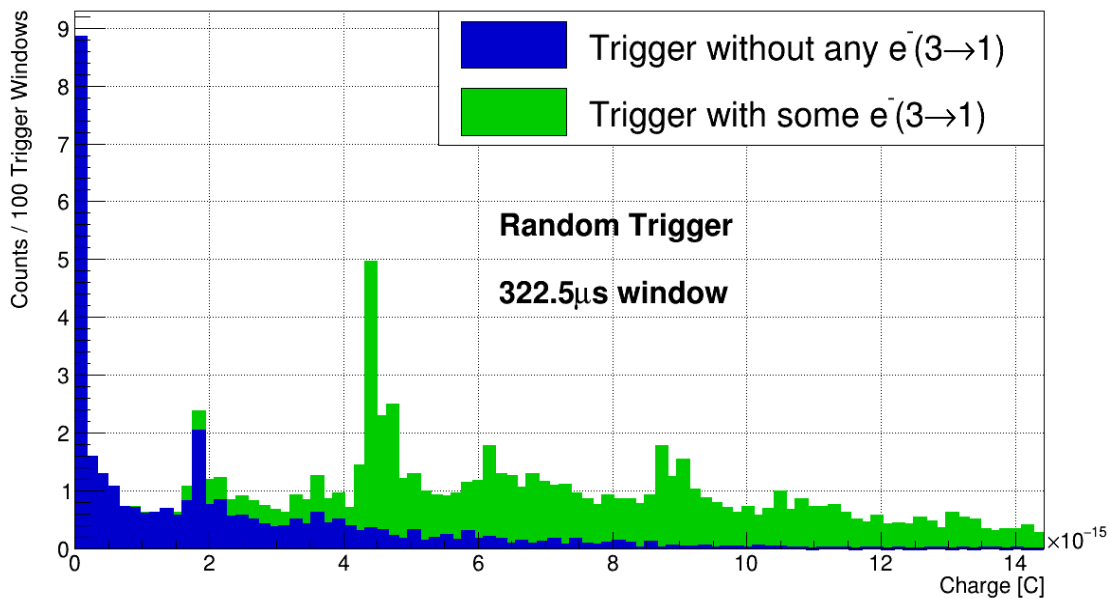


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50L: Bi207 simulation

Simulation of Bi207 source: Luke Saunders (Boston U.), F. Barao, J. Antunes + students (Lisbon U./LIP)

Charge per trigger event (strips 23+24)



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50L: protoDUNE plans

NP04 (protoDUNE-HD)

- ✓ NP04 closing is foreseen early next year (2024)
- ✓ a single source to be installed in NP04
- ✓ Bi207 source installation can be done near the closing date (a couple of days before) through the manhole (using a tripod, no scaffolding)
- ✓ source will be installed in the cathode, near the bottom or at a height man-reachable
- ✓ cathode will filter electrons in one of the drift volumes, providing an asymmetry on the source events detection
- ✓ a large space charge effect in protoDUNE creates large variations in electron drifts
- ✓ using two sources installed near the cathode and anode, not useful for the measurement of liq. Argon purity

$$Q \propto \exp\left(-\frac{vt}{L}\right)$$

Bi207 source installation sequence



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50L: protoDUNE plans (cont.)

NP02 (protoDUNE-VD)

- ✓ Francesco envisages placing in NP02 beyond the standard purity monitor:
 - a purity monitor ignited by a Bi207 source instead of light incident into a cathode material
 - a 50L setup (without shield case) which could allow the measurement of liq. Argon purity even over liq. argon filling phase

(F. Pietropaolo, CERN)

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