50L Electric Field Testing

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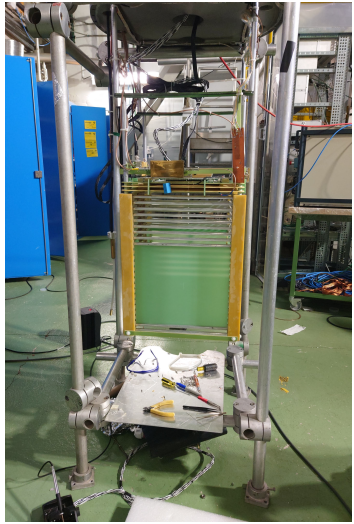
50L Field Cage Changes

- 50L field cage was replaced by G10 insulator:
  - covers all 4 wall,
  - starts at 5 cm from the bottom and ends at 34 cm,
  - $\sim$ 62% of the vertical length.
- One wall has a series of resistors for a divisor chain.
- Geometry details:
  - vertical drift length: 52 cm (325 µs),
  - horizontal lengths: 33 cm $\times$ 33 cm.



Hypothesis

Insulator panels will gain charge by electrons from interactions. Electric field will become uniform after some time and a field cage will not be required.

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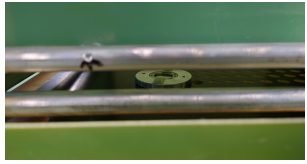
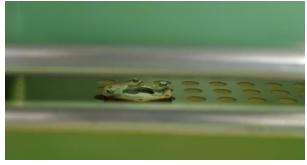
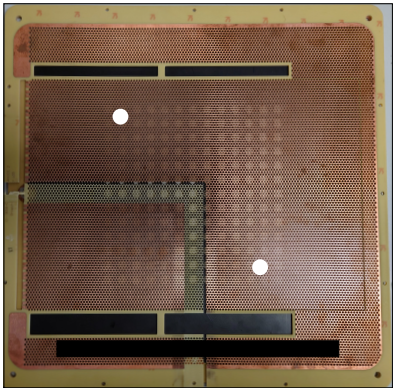
Test

With two Bi^{207} sources on opposite corners of the 50L, we can see how the channels which read these sources change over time. Show by summing non-cosmic events and viewing *hot* channels.

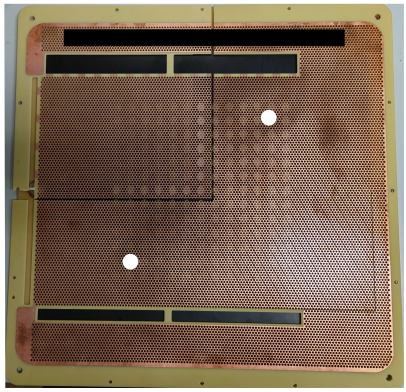




Expectations



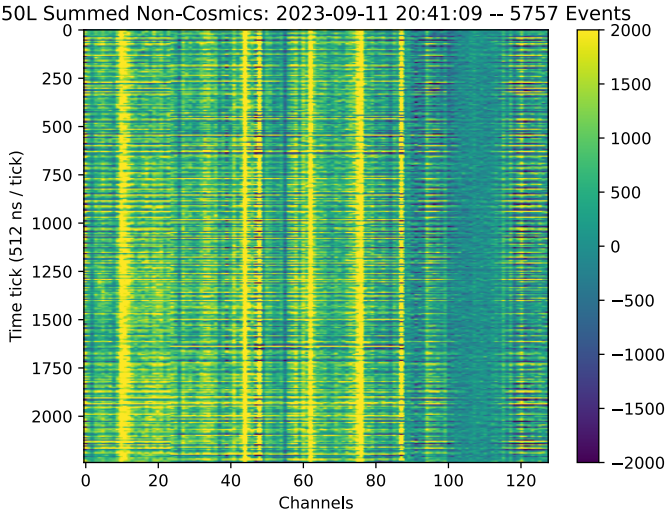
Collection



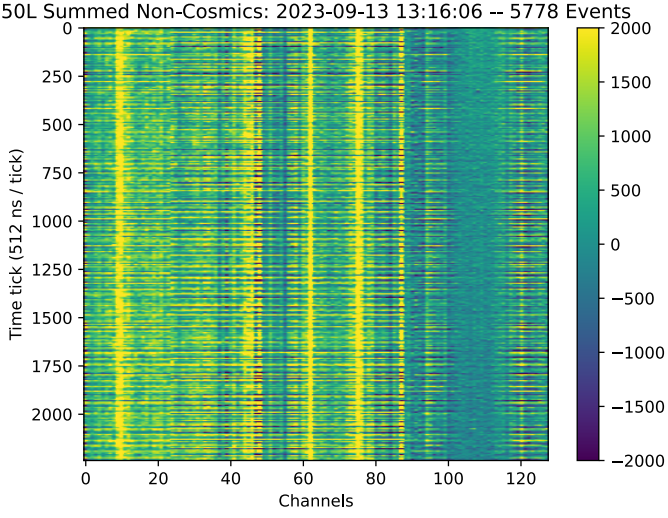
Induction 1

Bi^{207} locations are marked by the dots. Black bars mark the resistor wall. Expect channels 7, **8**, 9 and 40, 41 to show source activity.

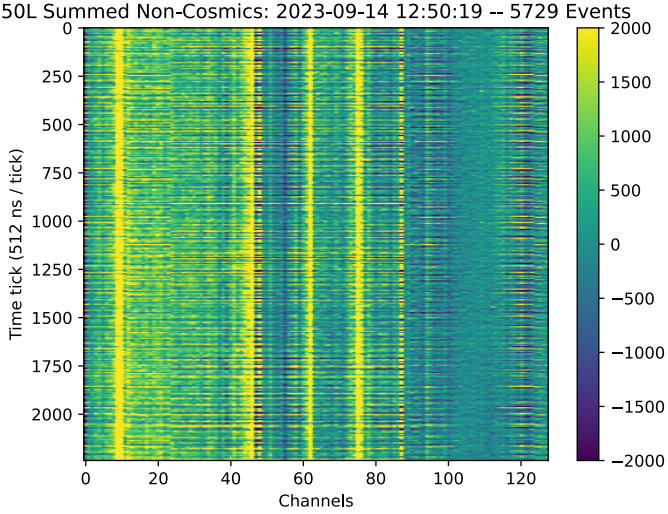
Hot Channels



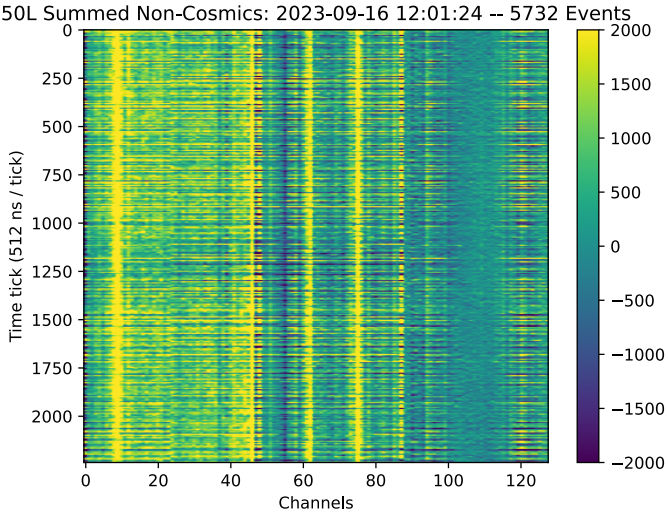
Hot Channels



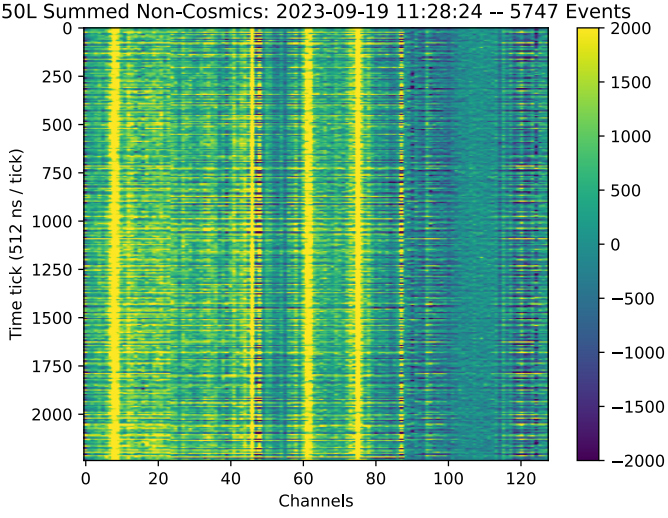
Hot Channels



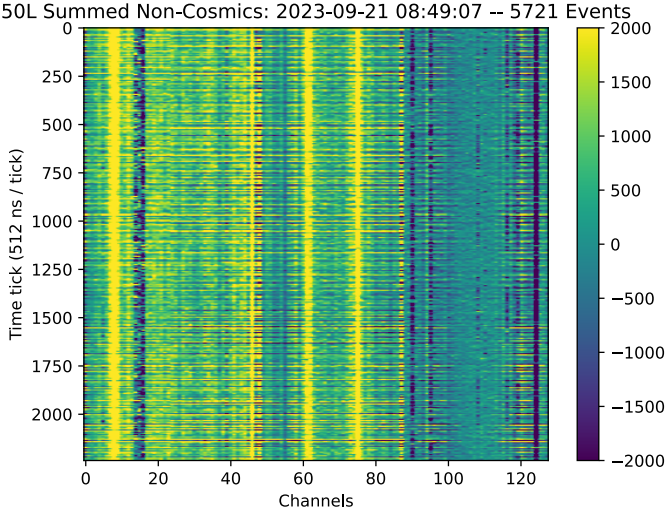
Hot Channels



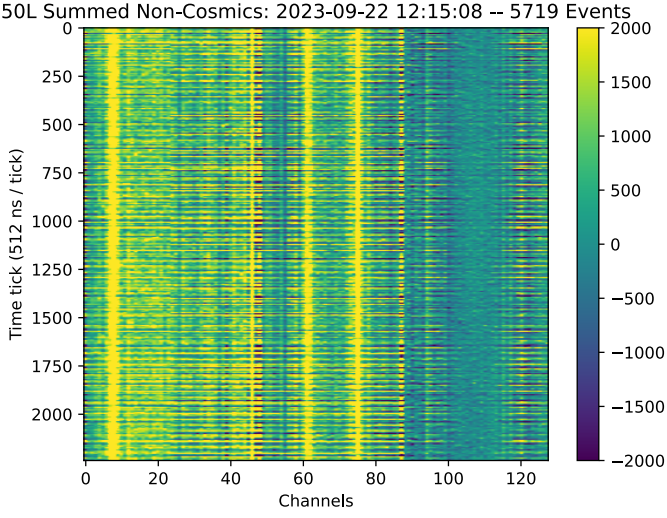
Hot Channels



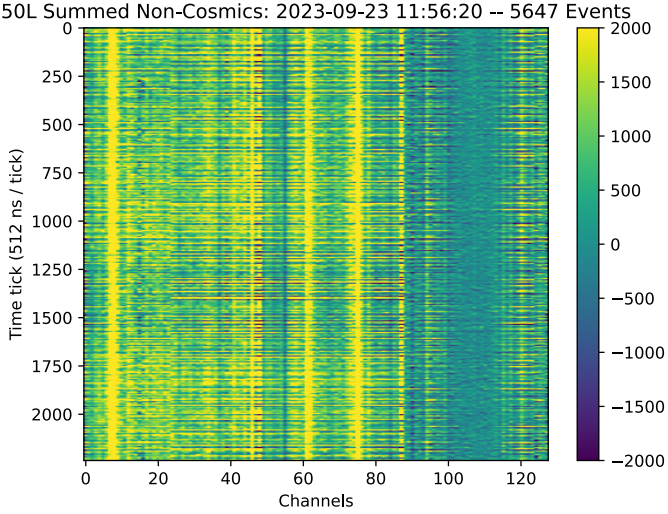
Hot Channels



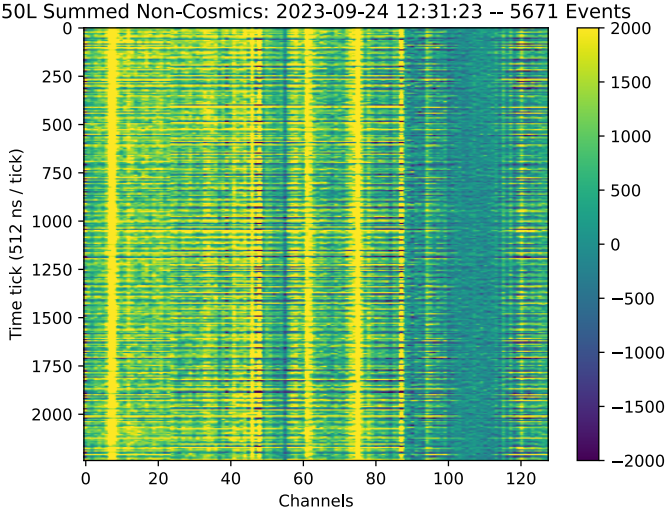
Hot Channels



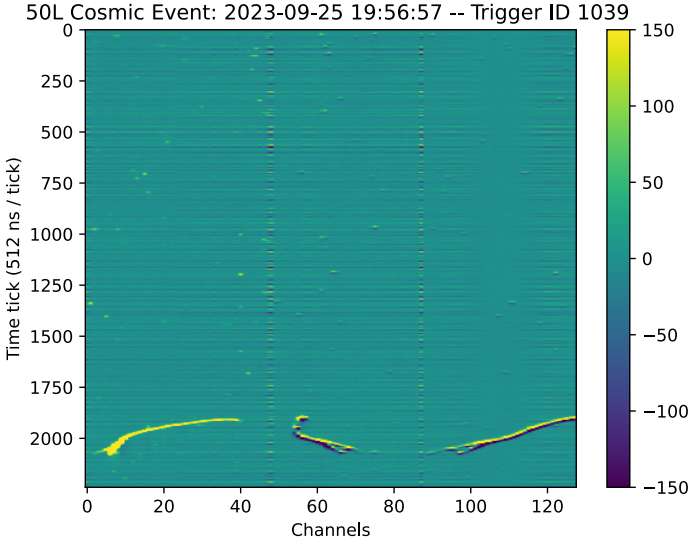
Hot Channels



Hot Channels



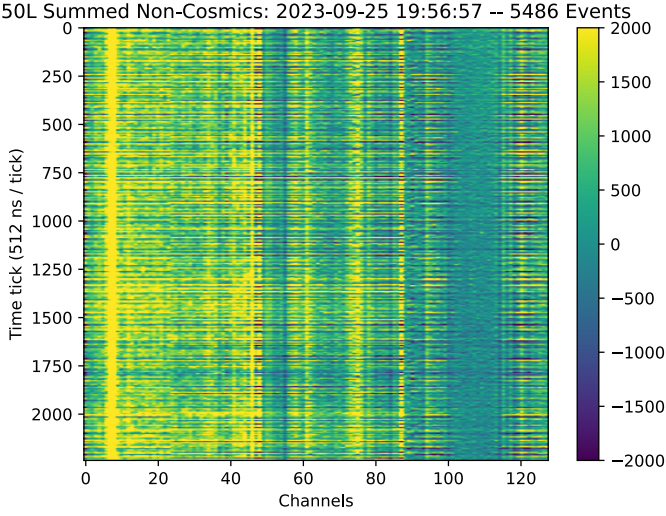
Effect on Cosmic Tracks



Side Notice

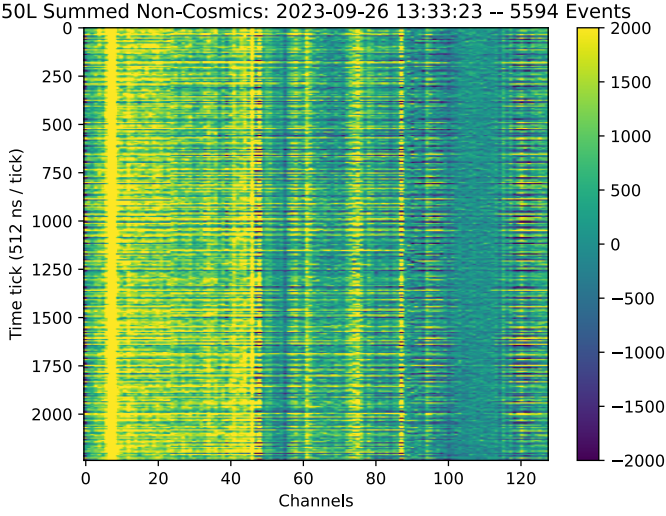
- Induction 2 *appears* transparent.
- Induction 1 does not.
- What happens if we change the voltages?
  - Shield: 1.3 kV $\rightarrow$ 1.5 kV $\rightarrow$ 1.45 kV.
  - Induction 1: 340 V $\rightarrow$ 500 V $\rightarrow$ 340 V.

CRP Transparency



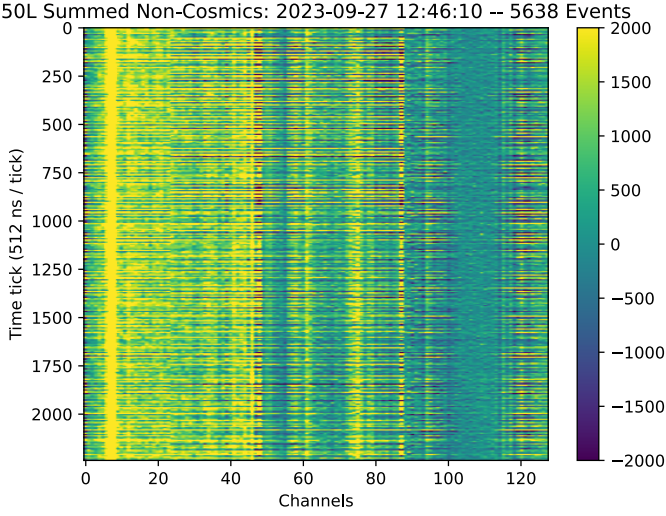
S: 1.5 kV, I1: 500 V

CRP Transparency



S: 1.45 kV, I1: 340 V

CRP Transparency



S: 1.45 kV, I1: 340 V

Conclusions

- Insulators are charging up *slowly*.