On the road for the understanding of N_{PHE} (?)

Follow-up

07/02/2025

Two types of data

CERN beam Aluminium-Trolls : troll1 & troll2

General requirements :

- v3 processing
- general cuts :
  - muonType==20 (crosses all GRAINITA)
  - eventType==4
  - hitTotCor<1500 &&diffTrack2<1
- do not use the uniformisation parameters from Hervé
- if needed correct for the bad SiBB settings

Cosmics

Aluminium-Troll : troll1 (Published)

Plastic-Troll : troll4

New data

ZnWO4 + air (October)

ZnWO4 + H2O (beginning of November)

ZnWO4 + air (end of November)

ZnWO4 + HL (mid December)

Dark current runs (Ianina)

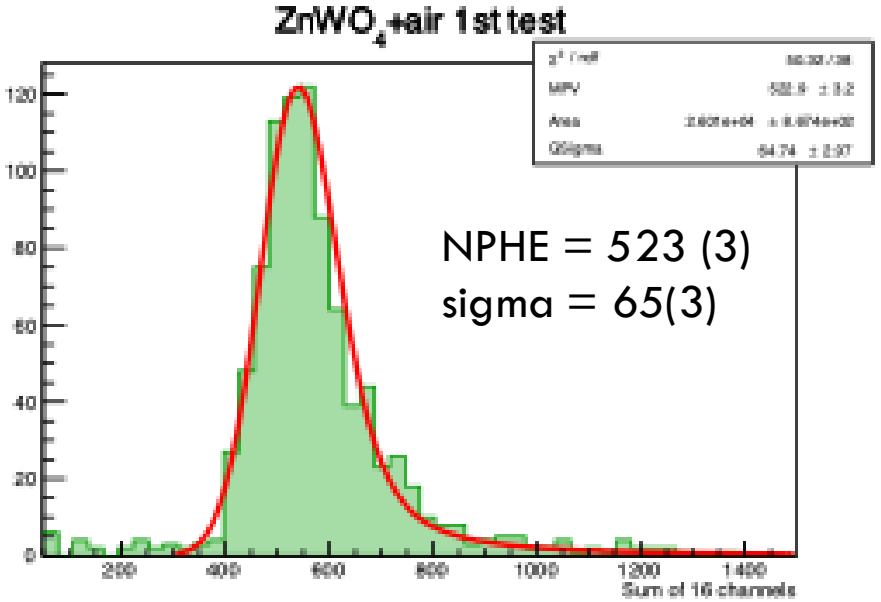
Troll	Date	Sum of 16	4 central	Noise/channel
1	01/10/2024	58.0	15.0	3.6
2	24/9/2024	71	18	4.4
3	09/09/2024	74	19	4.6
4	01/10/2024	53.7	13.2	3.4
4	04/11/2024	67.6	17.2	4.2

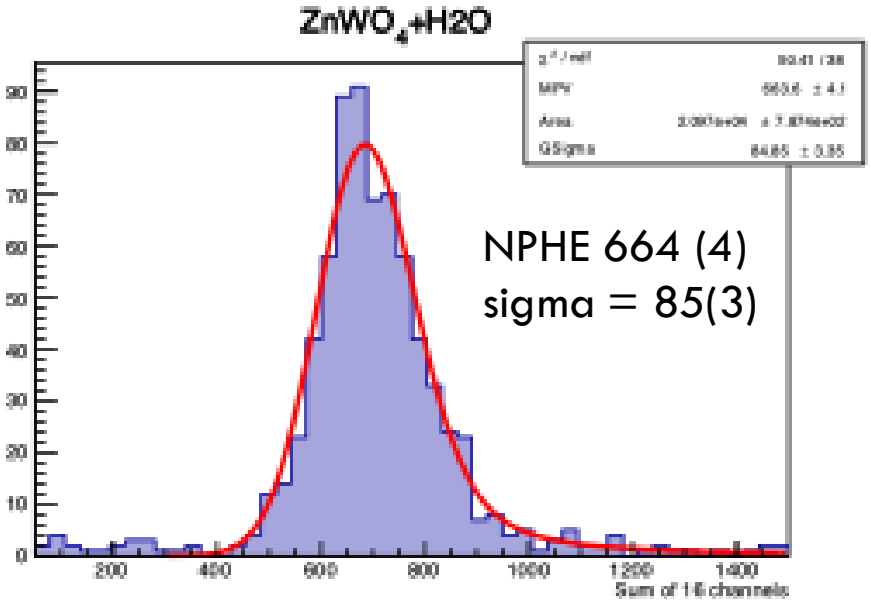
Use 60 for Troll4 !

New Troll : plastic frame instead of Al frame

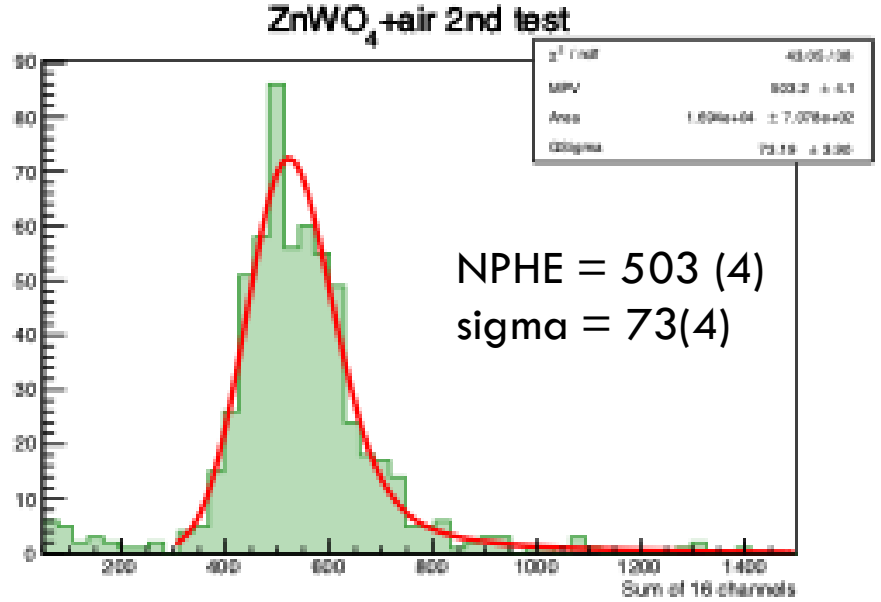
sequence of data :
ZnWO4 + air (October)
ZnWO4 + H2O (beginning of November)
ZnWO4 + air (end of November)
ZnWO4 + HL (mid December)

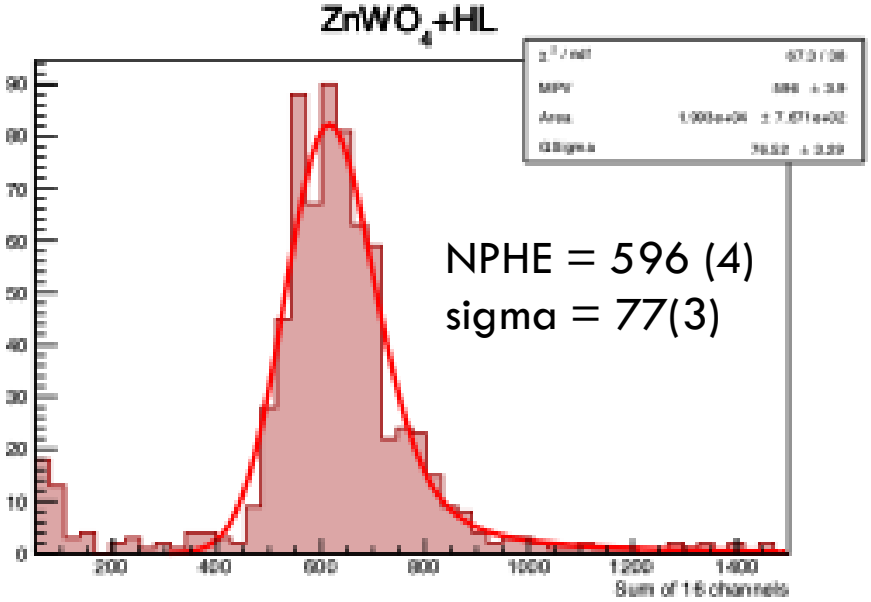
Cosmics



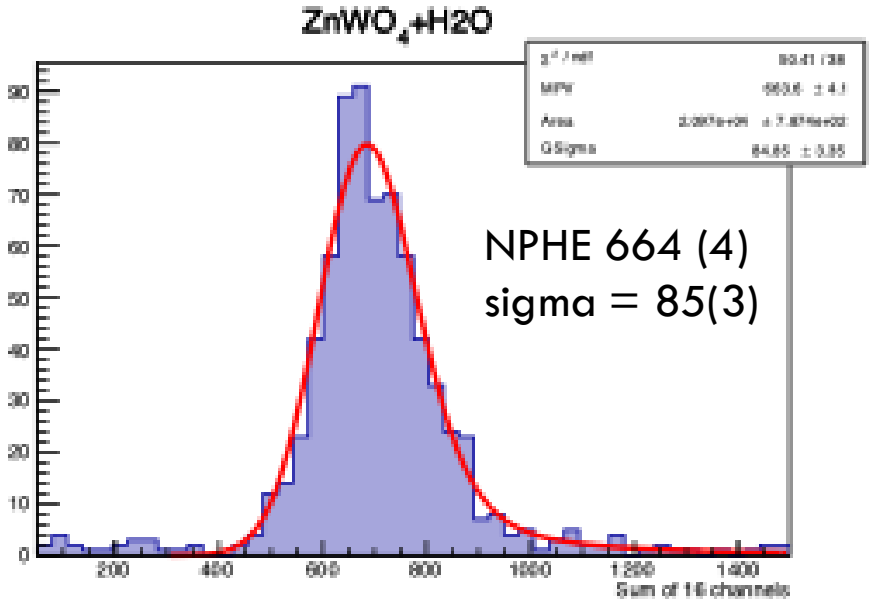


Troll4, different configuations





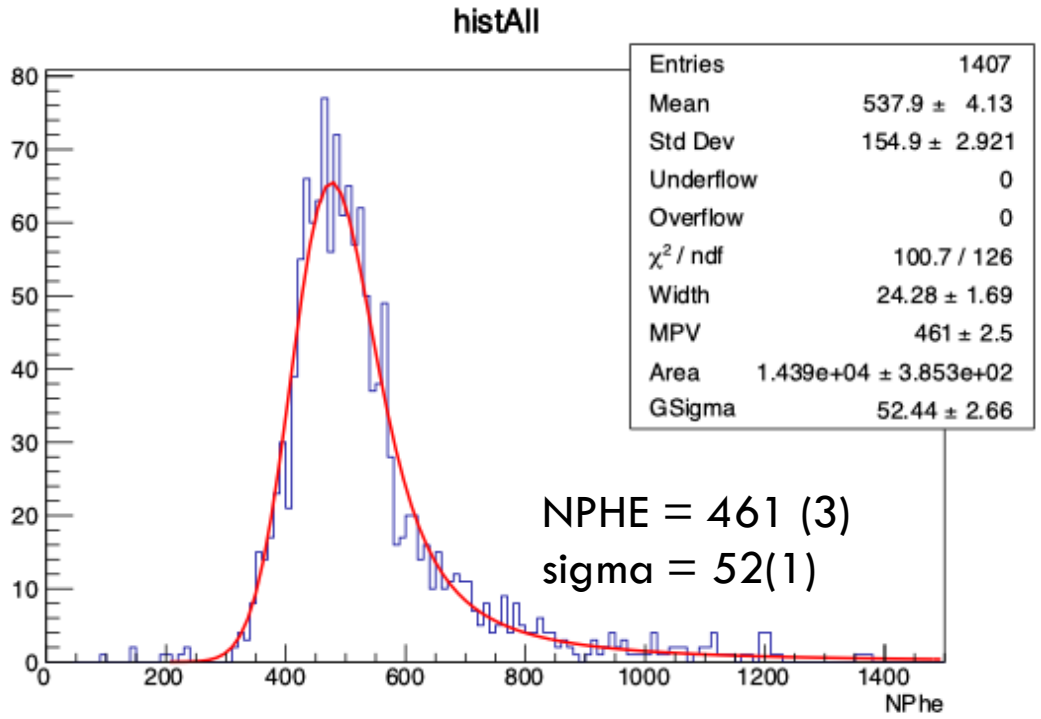
Corrected for Dark Noise



TROLL4

to be compared with the data recorded at the test beam (Muon, H2O, good SIBB)

|xM|<1 && |yM|<1 to mimic the 2x2 scintillator used in the cosmics bench



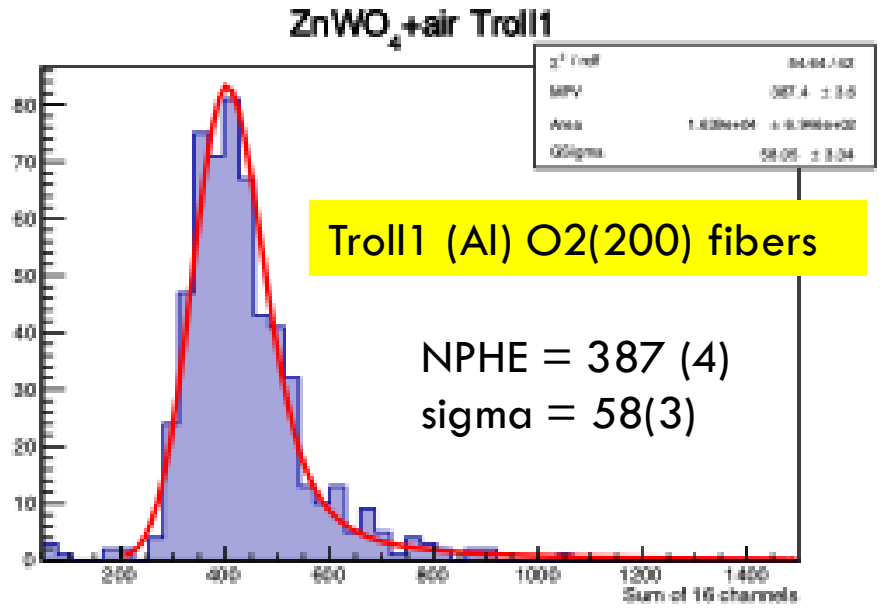
RUN33 – 34 TROLL1
Muon – H2O

what differs is the troll !

Use again the cosmics data recorded by Ianina :

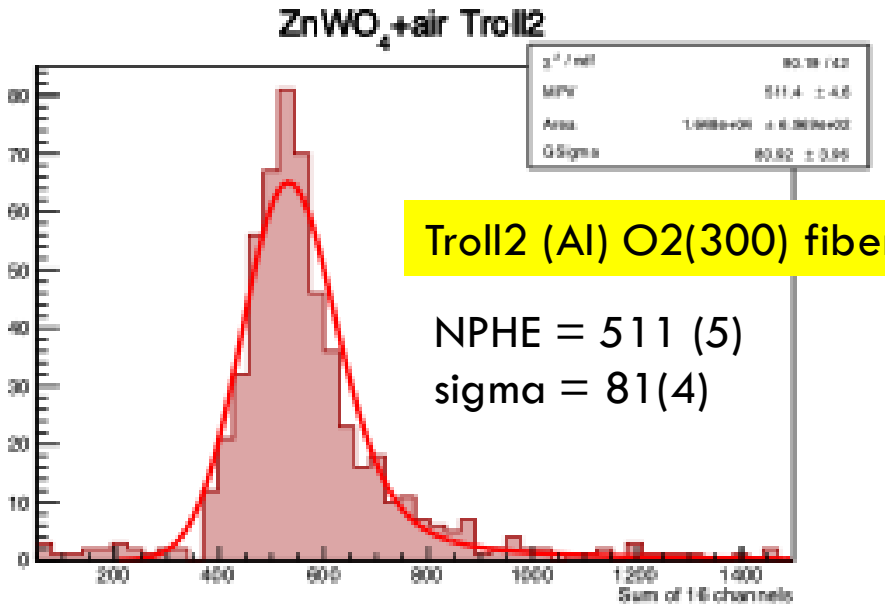
Corrected for Dark Noise

ZnWO4 + Air



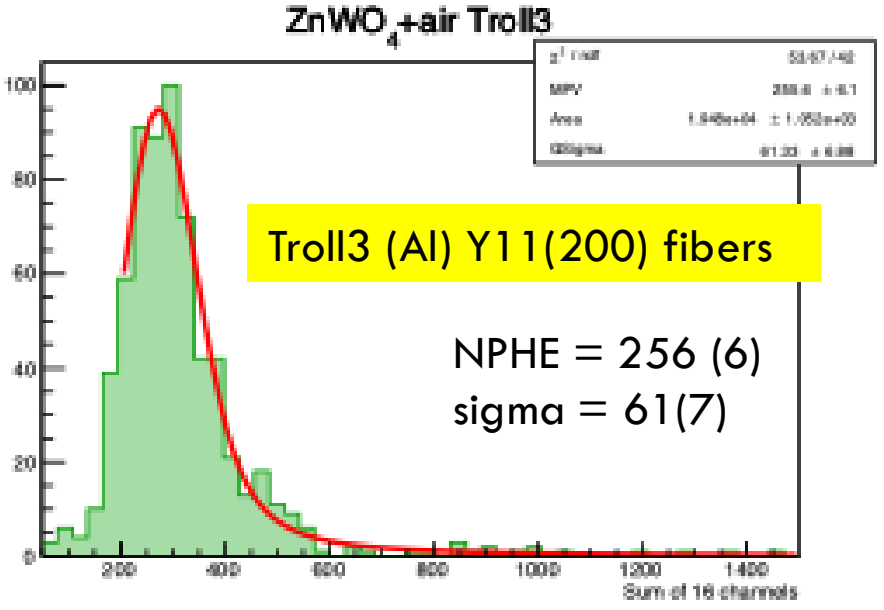
Troll1 (Al) O2(200) fibers

NPHE = 387 (4)
sigma = 58(3)



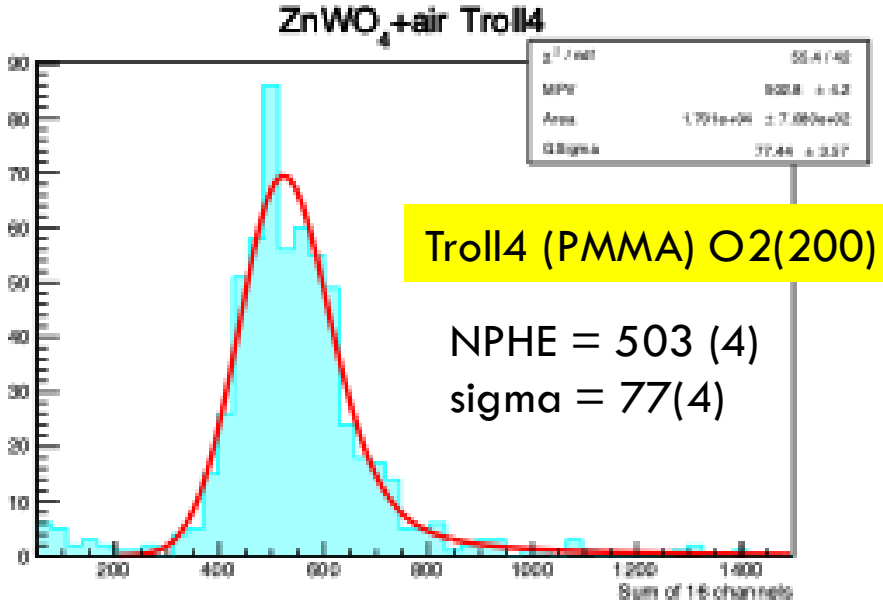
Troll2 (Al) O2(300) fibers

NPHE = 511 (5)
sigma = 81(4)



Troll3 (Al) Y11(200) fibers

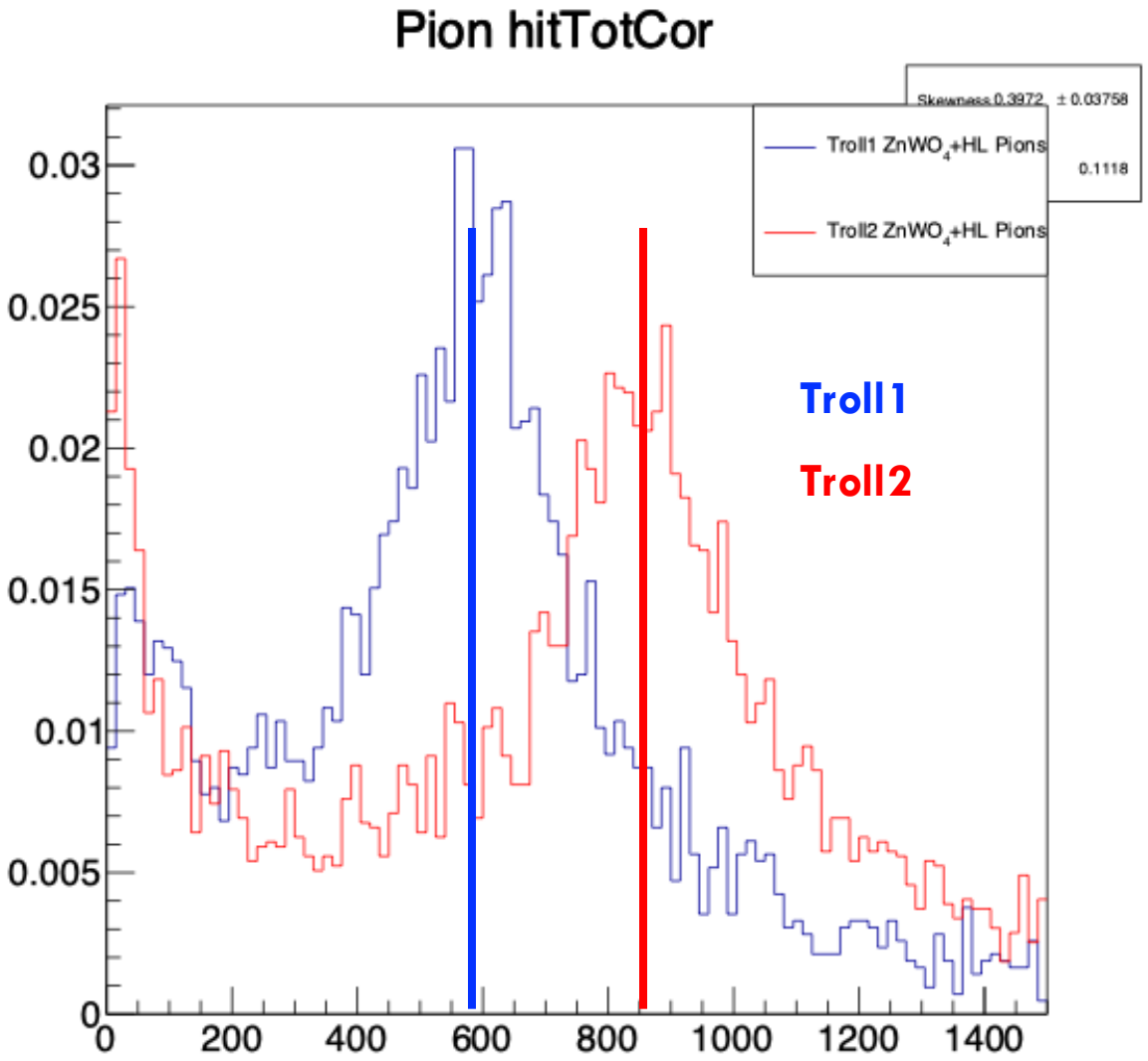
NPHE = 256 (6)
sigma = 61(7)



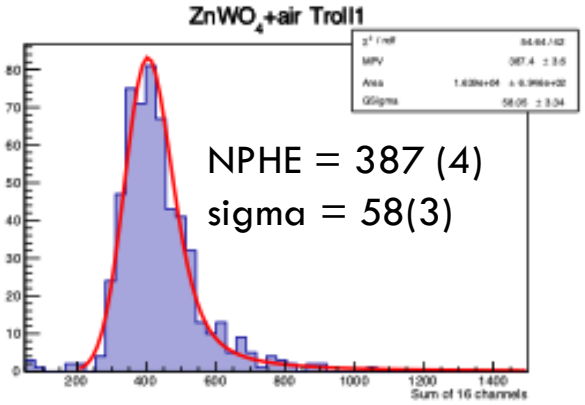
Troll4 (PMMA) O2(200) fibers

NPHE = 503 (4)
sigma = 77(4)

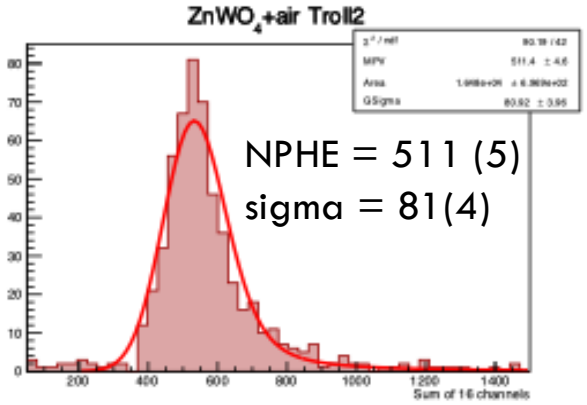
With test beam data the only possible comparison between Troll1 & troll2 is Pion beam with HL,



Troll1 (Al)
O2(200)
fibers



Troll2 (Al)
O2(300)
fibers



Similar pattern
511/387 = 1.3
850/600 = 1.4

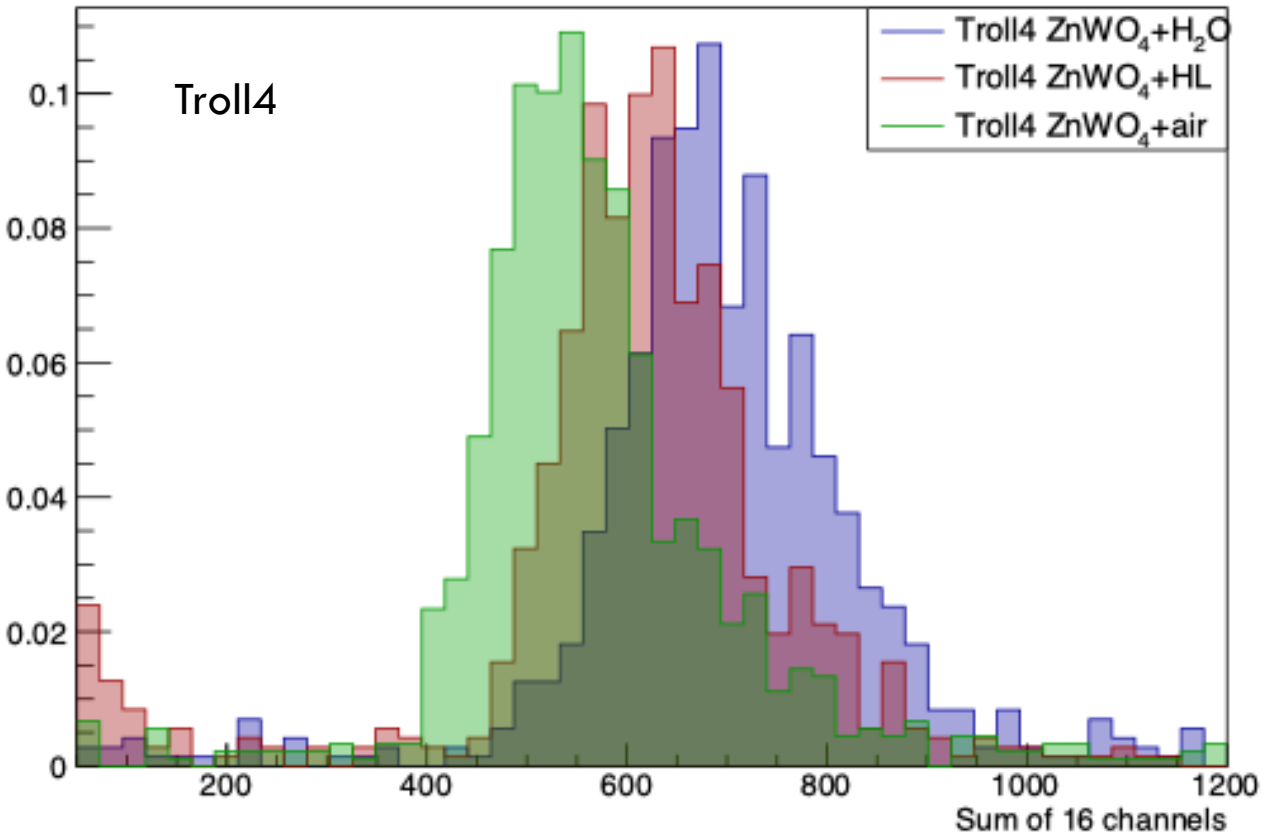
- Troll1 is by far the worst Troll ;)
- Most of our test beam data is with it. Enough N_{PHE} for uniformity

Troll	Configuration	NPHE (MPV)	Sigma
1 ((Al) O2(200))	ZnWO4 + air	387(4)	58(3)
2 ((Al) O2(300))	ZnWO4 + air	511(5)	81(4)
3((Al) Y11(200))	ZnWO4 + air	256(6)	61(7)
4 (PMMA O2(200))	ZnWO4 + air	503(4)	77(4)

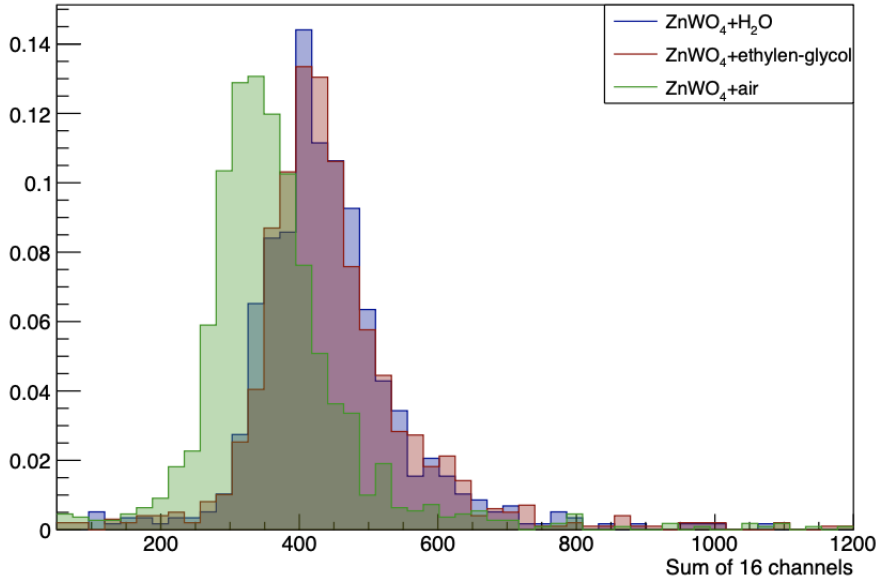
What can we learn from that ?

- Fibers to SiPM ?
- Something else ?

- Cosmics & test beam indicate that Troll2 is significantly better but we have only HL Pion data with it. We know that HL has bubbles … so not as good as we could hope.
  - Would it make sense to try to cross check the uniformity map with Troll2 ? (Do we see the bending of the fibers too ?)



Troll1 - Published



This is pretty encouraging (in particular keeping in mind that HL is really heavy now [fastfloat])

To think about :
What do we do more ?
How do we propagate these informations ?

Back-up slides

Run#	Troll Type	Data type	Comment	Dark
11	Troll1 Water	LED + piedestal ?		118 – Event Type = 4 LED reste piedestal ?
24	Troll1 Water	LED-only		Event Type = 4 LED
25,30,31,32	Troll1 Water	Electron		~120 – 130
33,34	Troll1 Water	Muon		~130
35,36,37,38,39,40	Troll1 Water	Pion.	changes in position of GRAiNITA … Beam changes	~130
41,42,43	Troll1 Water	Pion	With 3x3 in the trigger (Samedi soir S, MH)	~140
44,45	Troll1 Water	Pion	No 3x3 in trigger. Dimanche matin… (Giulia & co)	~130
47	Troll1 Water	Pedestal		~119
48	Troll1 Water	LED		118 .
50,51	Troll1 Water	Pion	Trigger 5x5	~130
52	Troll2 Heavy L	LED	Degraded SiBB	203. SIBB pb from here
53,54,55	Troll2 Heavy L	Pion	Trigger 5x5 Degraded SiBB	210
56	Troll1 Heavy L	LED+pedestal	Degraded SiBB	Bizarre du beam ???
57,58	Troll1 Heavy L	Pion	Trigger 5x5 Degraded SiBB	180 ?
59,60	Troll1 Heavy L	Muon	Degraded SiBB	211
61	Troll1 Heavy L	LED	Degraded SiBB	204 eventType = 4 = LED
62	Troll1 Heavy L	LED	Normal SiBB	125 eventType = 4 = LED