July test-beam data
Triples & ageing

Gigi Cappello
Università di Catania / INFN Catania

Investigated runs

July

Run	Type	Events	Run Time [s]	cfg	Scaler	Mapping	Target [ug/cm2]	Trigger	Beam	Theta [deg]	Phi [deg]
Triples run ((DE&E)||Mon+Any-PMT) w. new thick CH2 target (388 µg/cm²) and high beam current (>20nA)											
199	Triple	233471	5201	TestBeam_LSci	245172	channelmapping_lsci_testbeam	CH2 - 388	Coincidence	28 MeV	5,05	56,37
200	Triple	180212	3233	TestBeam_LSci	216633	channelmapping_lsci_testbeam	CH2 - 388	Coincidence	28 MeV	5,05	56,37
201	Triple	1025129	21268	TestBeam_LSci	1237476	channelmapping_lsci_testbeam	CH2 - 388	Coincidence	28 MeV	5,05	56,37
Triples run ((DE&E)||Mon+Any-PMT) w. 315 µg/cm² CH2 target and high beam current (~15nA)											
196	Triple	72633	7450	TestBeam_LSci	82766	channelmapping_lsci_testbeam	CH2 - 315	Coincidence	28 MeV	5,05	56,37
"Flower" run ((DE&E)||Mon) w. 315 µg/cm² CH2 target and lower beam current (~15nA)											
193	Coincidences	501029	3034	TestBeam_LSci	680444	channelmapping_lsci_testbeam	CH2 - 315	Si master	28 MeV	5,05	56,37

May (for comparison in triples analysis)

Run	Type	Events	Run Time [s]	cfg	Scaler	Mapping	Target	DAQ config	Trigger	Beam
121	Si + PMT in slave	58599	7981	Lsci	61956	lsci_testbeam	364 ug/cm2	Lsci	((DE & E) || Mon) & Any-PMT	Eb = 28 MeV
122	Si + PMT in slave	182084	28198	Lsci	193049	lsci_testbeam	364 ug/cm2	Lsci	((DE & E) || Mon) & Any-PMT	Eb = 28 MeV

Triples run ((DE&E)||Mon + Any-PMT) w. 364 µg/cm² CH2 target, beam current ~10nA and larger collimator

An out-of-the-box comparison between triples yield

MAY DATA (RUN 121 + 122)

start from 240683 events

Total run time : 36196 s (~10h)
Beam current : ~10nA
Target thickness : 364 μg/cm²

Found 44502 events in PMT4
Found 247 events in PMT4 + Wheel
Scaling factor: 528.684

JULY DATA (RUN 199 + 200 +201)

start from 1438812 events

Total run time : 29702 s (~8h)
Beam current : ~20nA
Target thickness : 388 μg/cm²

Found 41818 events in PMT4
Found 357 events in PMT4 + Wheel
Scaling factor: 196.922

x6 triggered events in Jul
~same PMT4 events
45% more triples

May Data

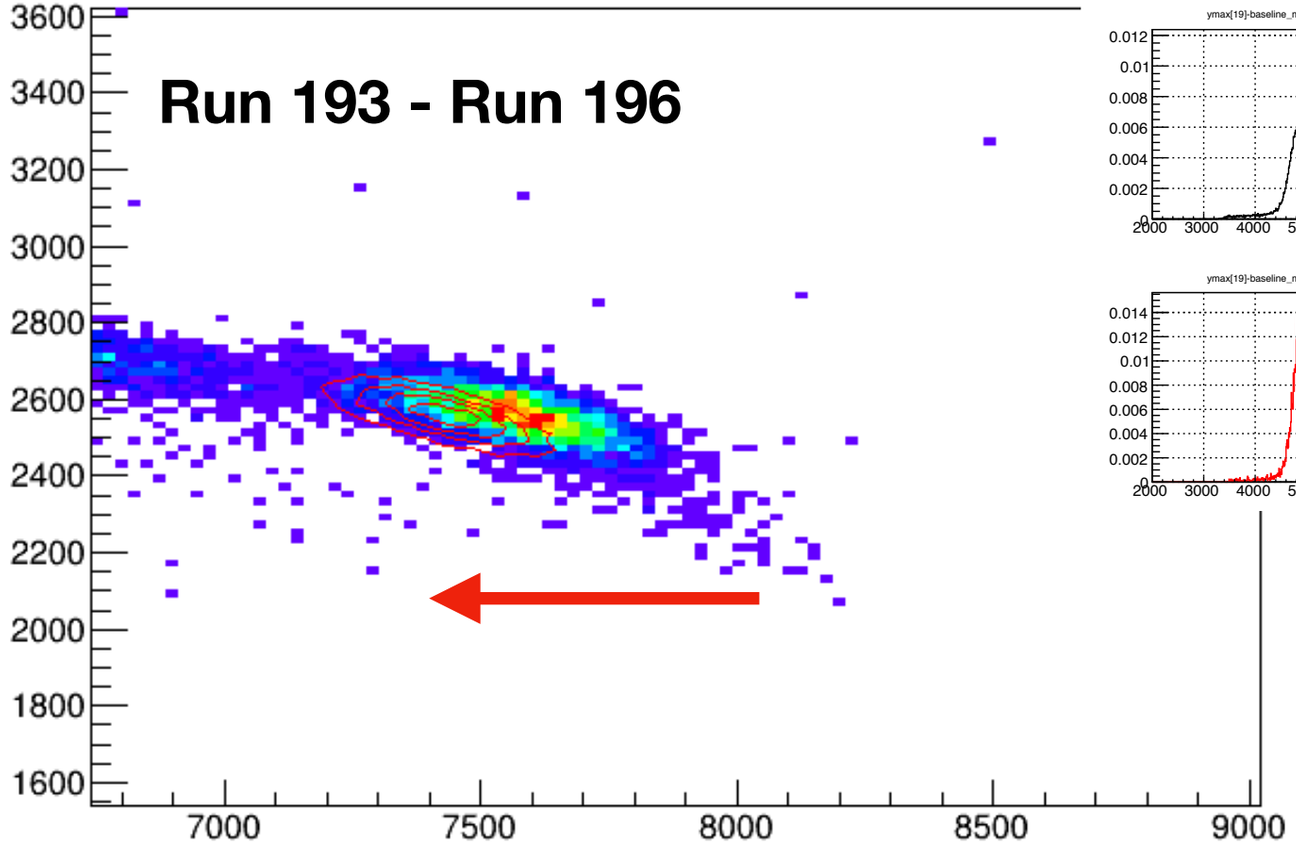
SiE: zerocount	117938	zero frac: 0.490014
SiMon: zerocount	122210	zero frac: 0.507763

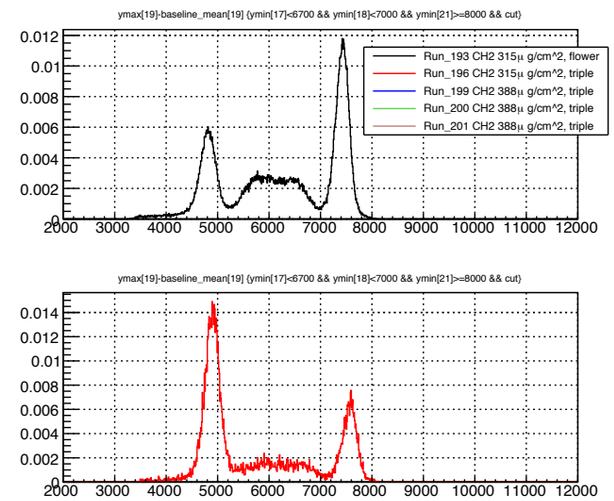
July Data

SiE: zerocount	1094953	zero frac: 0.761012
SiMon: zerocount	292365	zero frac: 0.23199

SiMon triggers are much more favoured

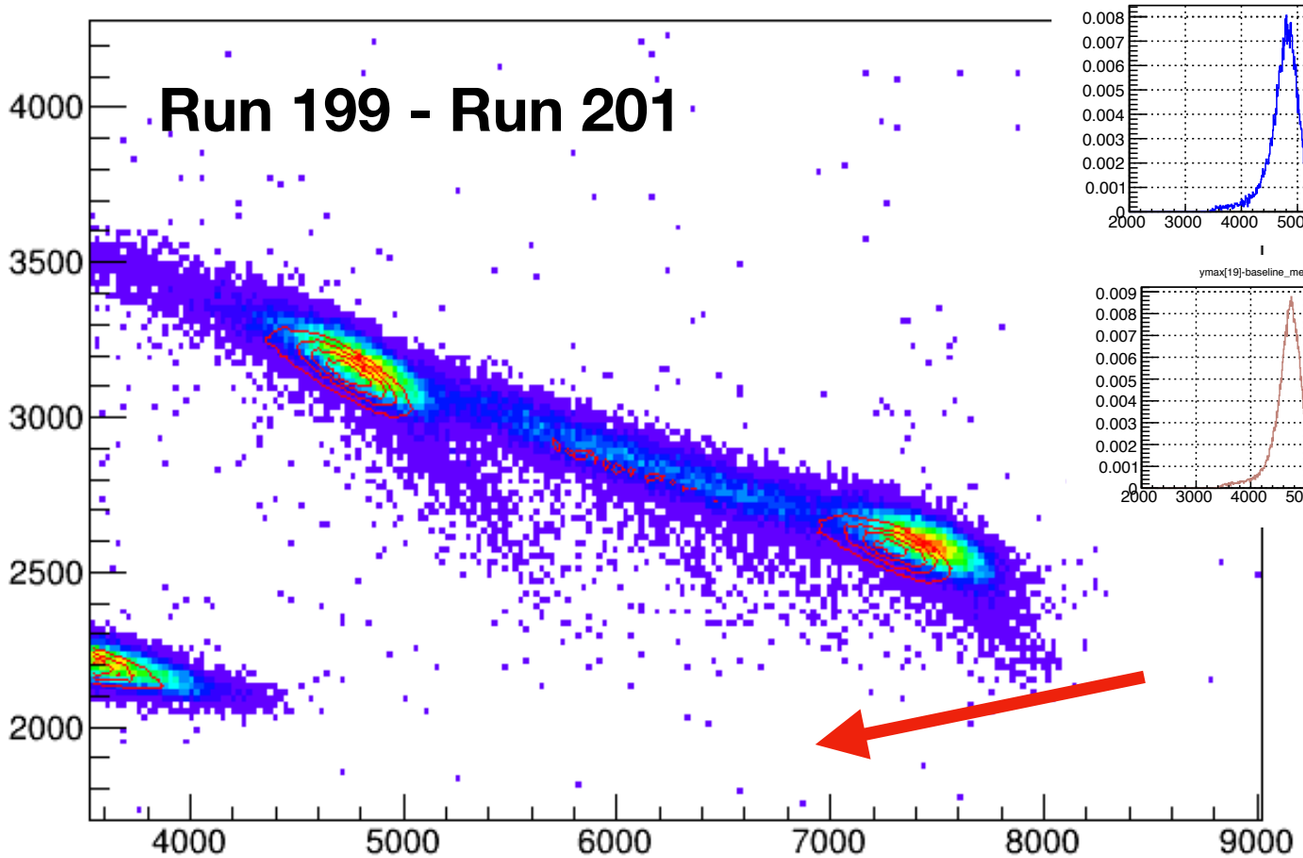
Work in progress on beam stability and target thickness/ageing effects

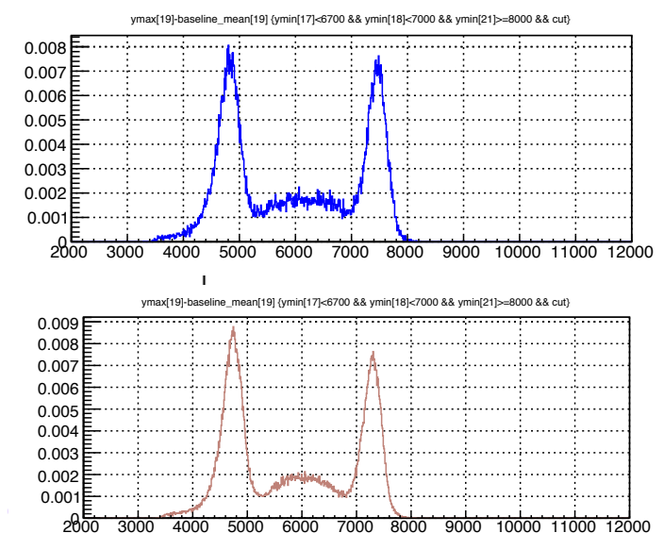




The E shift between different thickness targets (O(450keV)) is larger than what we should expect from dE effects in target

Moreover horizontal shift (E) also with the same target… something happened to the beam Energy?

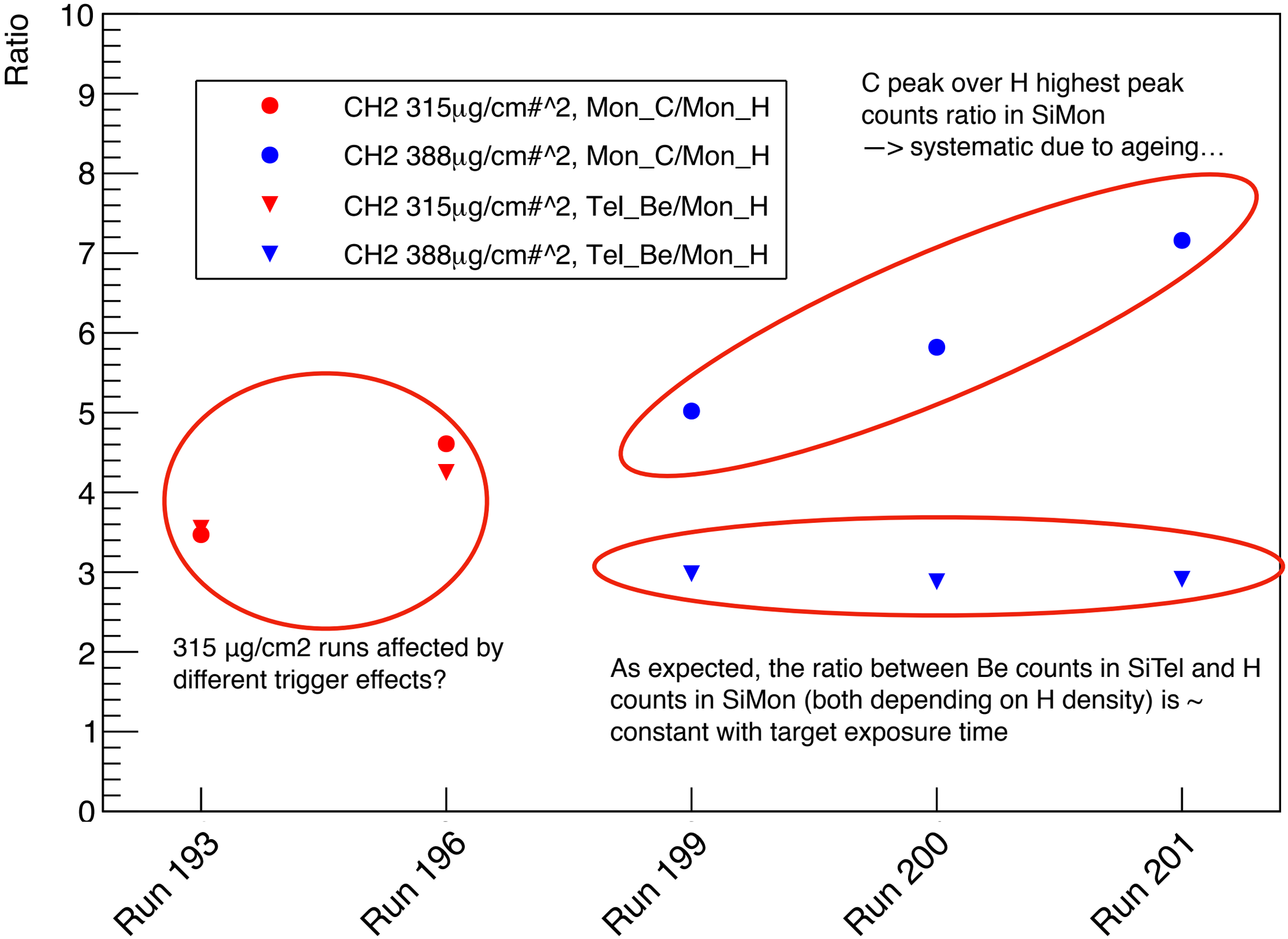




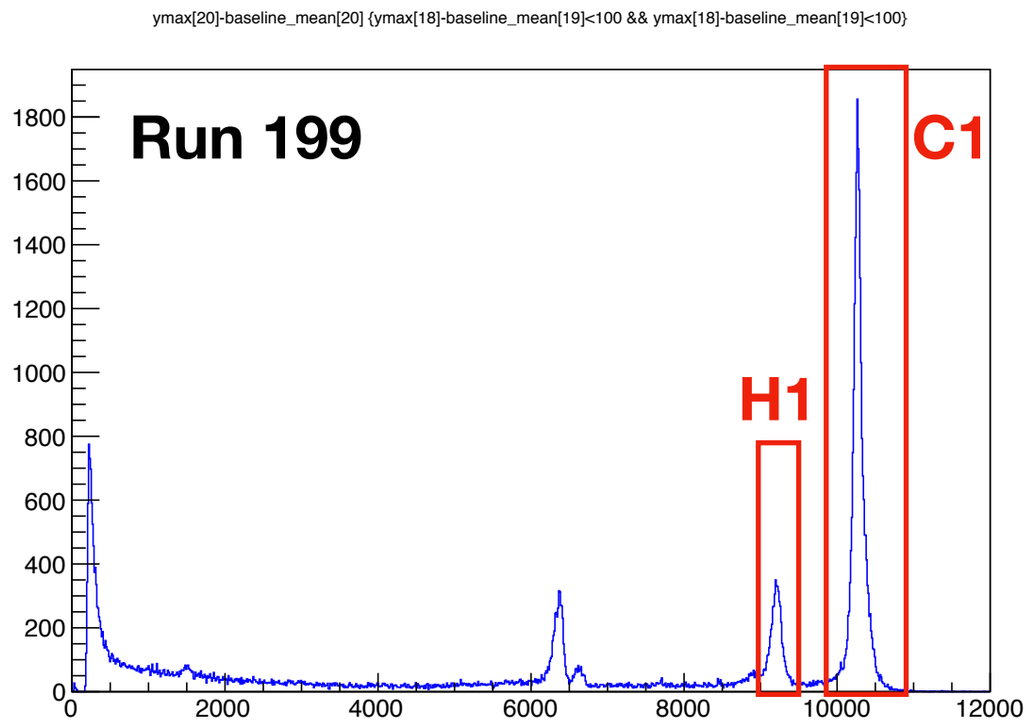
From LogBook:
"Beam expert wants to check and adjust the beam parameters"

Could a shift in beam energy lead to a wrong alignment in theta between SiTel and PMT4, making more likely to have Mon triggers? Dedicated studies ongoing

Work in progress on beam stability and target thickness/ageing effects



Disentangling C and H consumption effects in target ageing



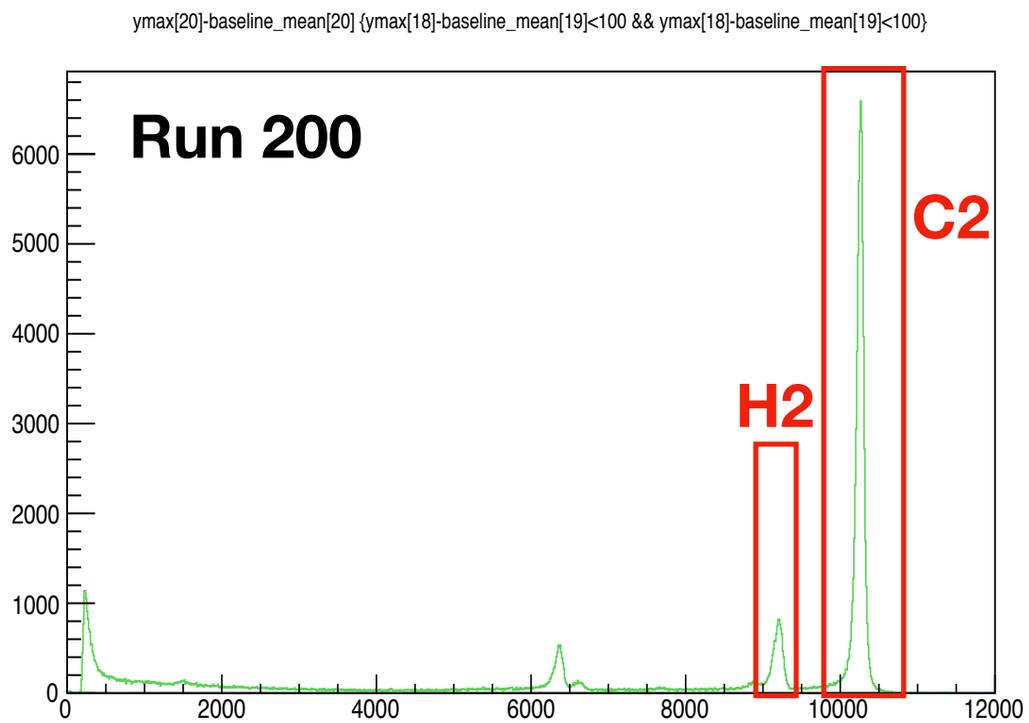
$$C_1 \propto \rho_{C1} I_1 t_1 \qquad H_1 \propto \rho_{H1} I_1 t_1$$
$$C_2 \propto \rho_{C2} I_2 t_2 \qquad H_2 \propto \rho_{H2} I_2 t_2$$

(first approx)

$$R_{1,2} = \frac{C_1/C_2}{H_1/H_2} = \frac{\frac{\rho_{C1}}{\rho_{C2}}}{\frac{\rho_{H1}}{\rho_{H2}}}$$

<— C consumpt.

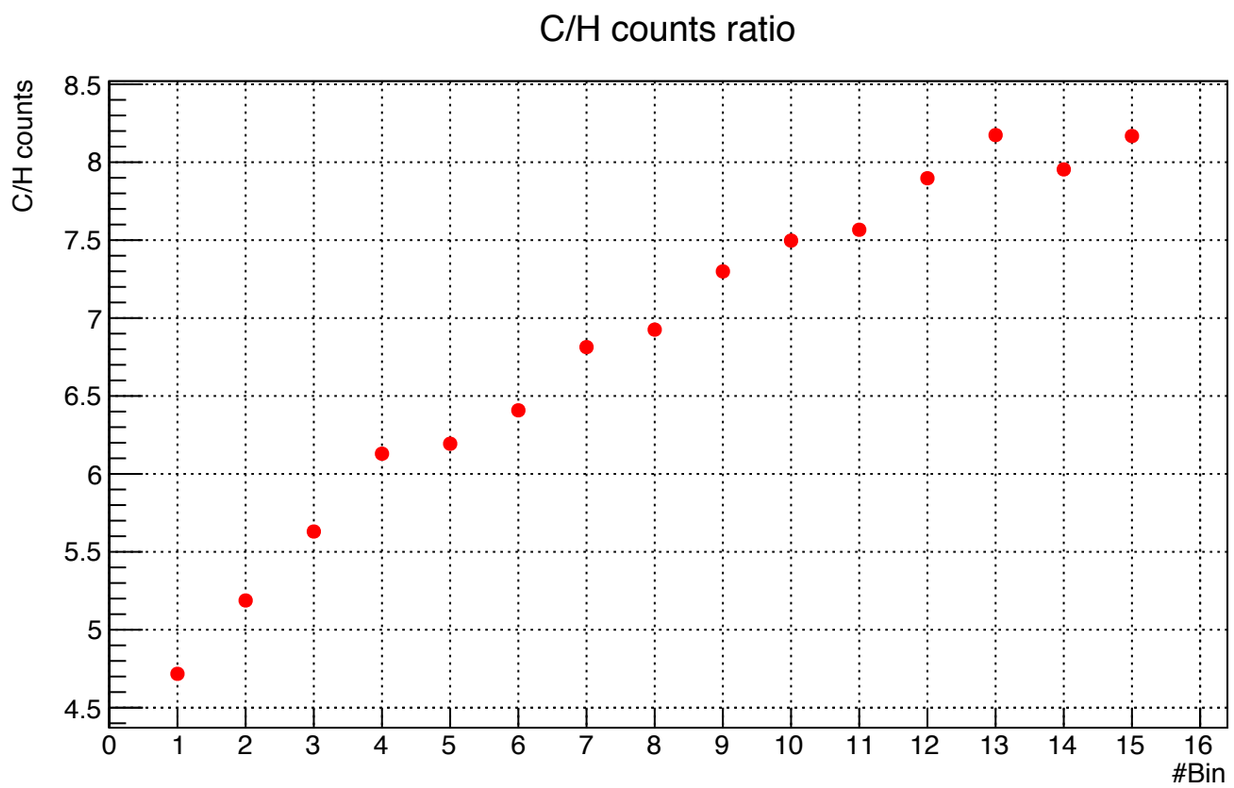
<— H consumpt.

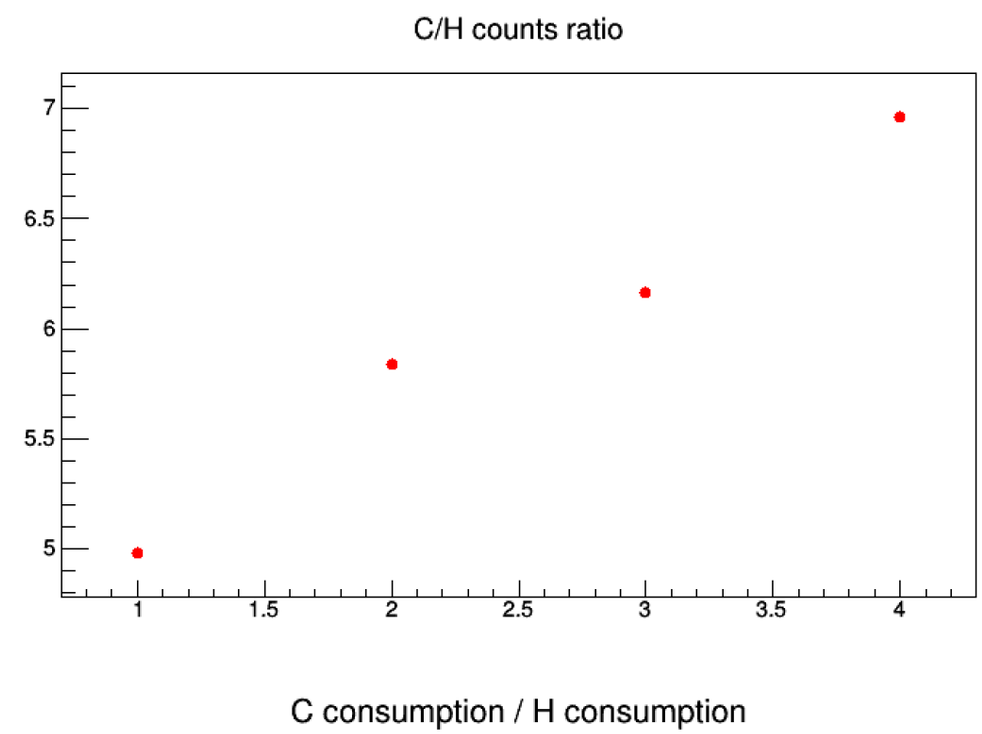


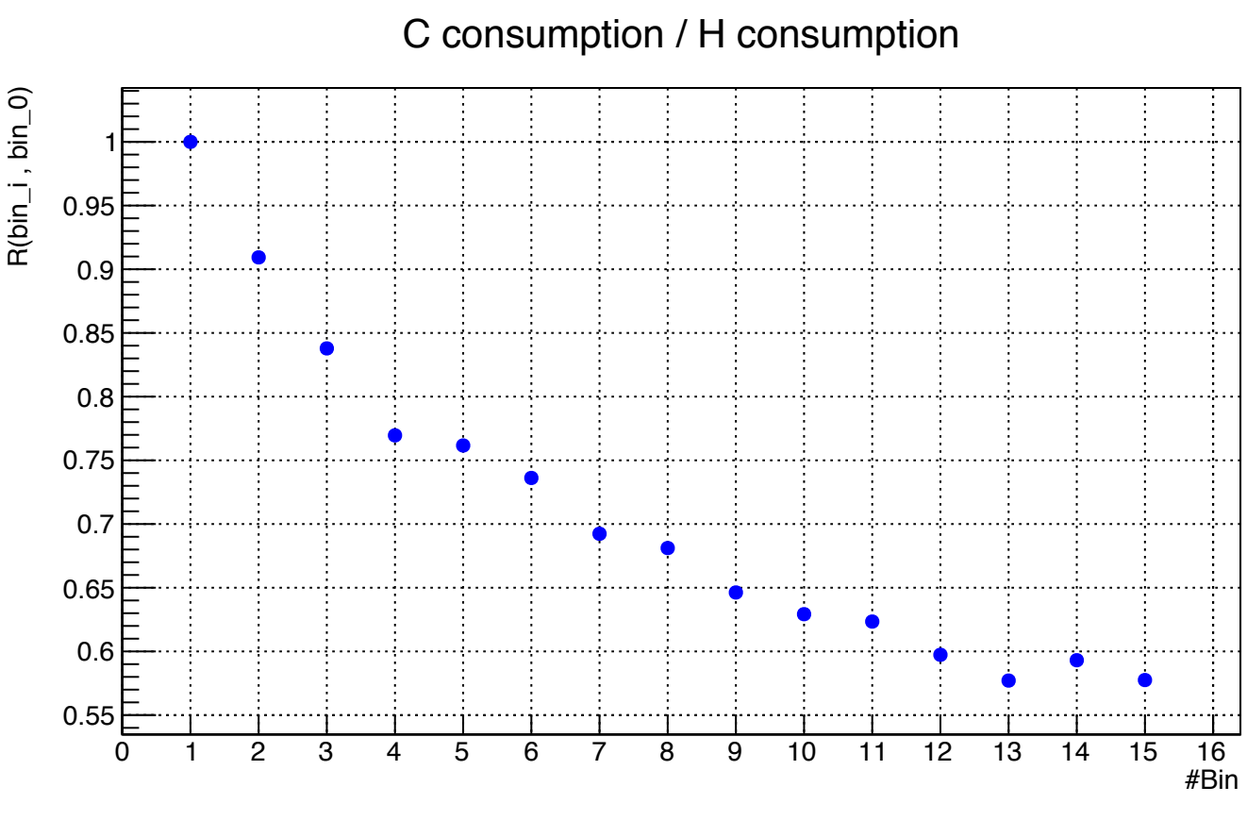
R(Run 199, Run 200) = 0.86
R(Run 199, Run 201) = 0.70
R(Run 200, Run 201) = 0.81

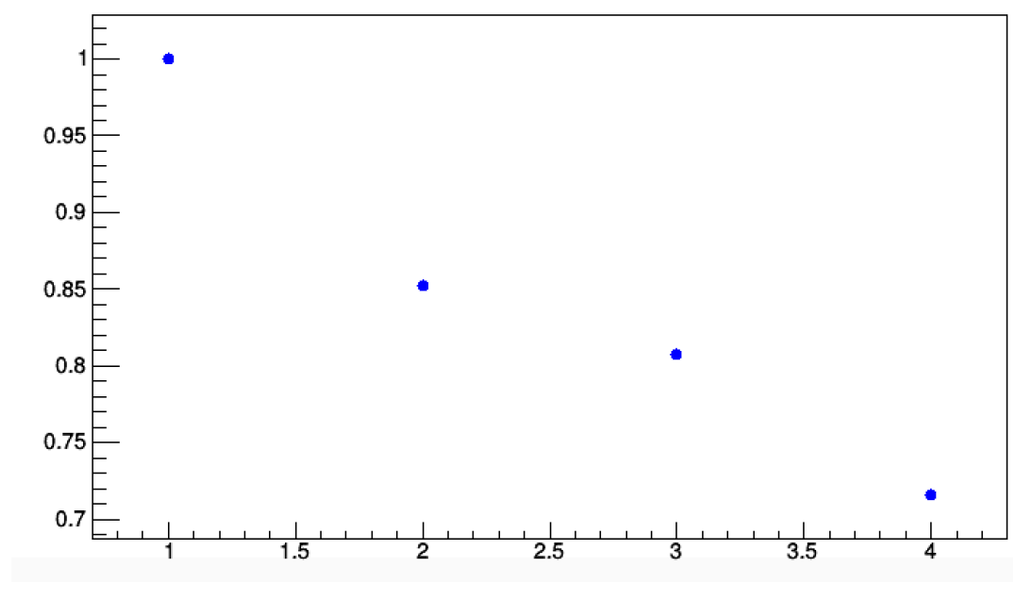
< 1 as expected, H consumption is faster than C one

Run199+200+201 divided in 15 time bins (~same events) to verify the trend due to target ageing for C/H(mon) and C and H relative abundancies



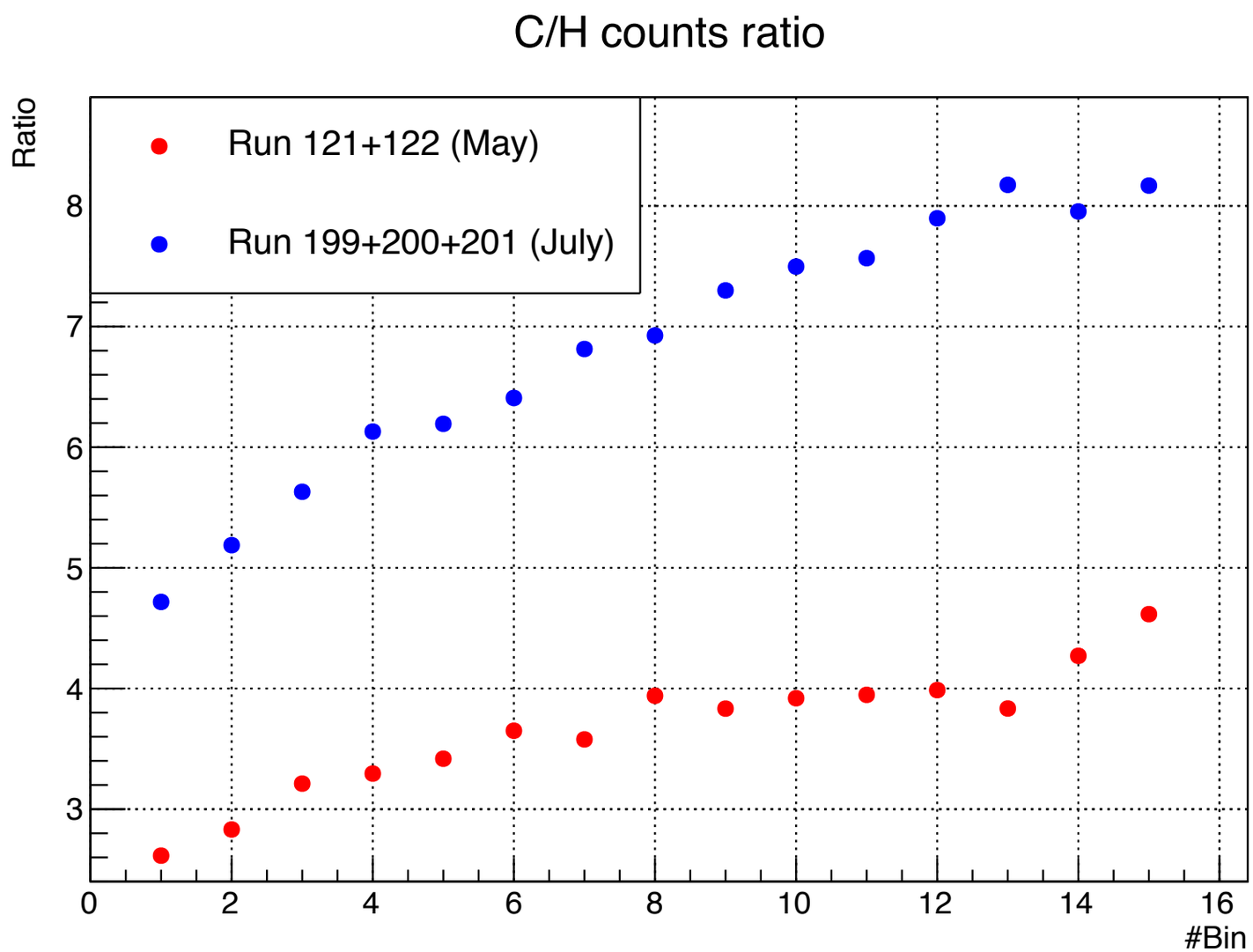






Same for run 196 (lower statistics —> 4 bins)

Ageing comparison between May (121+122) and July (199+200+201) runs



Why different initial values?
Why so higher in a brand new target (July)?

Triples

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Run_196

Run over 72633 events
Found 5654 events in PMT4
Found 30 events in PMT4 + Wheel
Found 8 events in PMT4 + PMT0

Triples/Total = 0.000413035
Triples/PMT4_ev = 0.00530598
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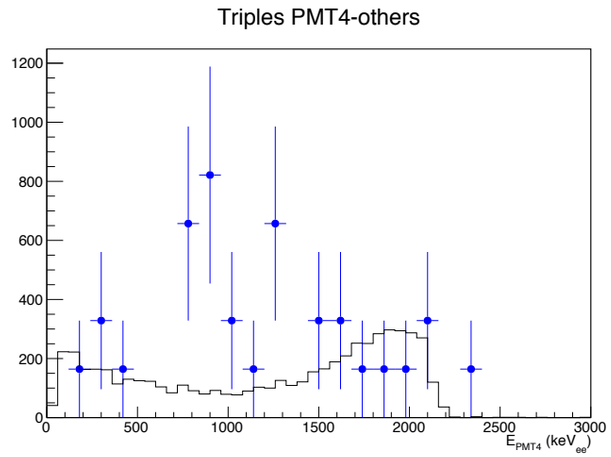


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Run_199

Run over 233471 events
Found 8135 events in PMT4
Found 72 events in PMT4 + Wheel
Found 11 events in PMT4 + PMT0

Triples/Total = 0.000308389
Triples/PMT4_ev = 0.00885065
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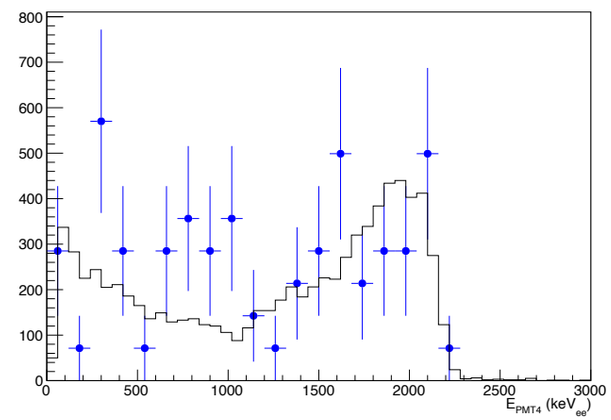


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Run_200

Run over 180212 events
Found 5582 events in PMT4
Found 48 events in PMT4 + Wheel
Found 8 events in PMT4 + PMT0

Triples/Total = 0.000266353
Triples/PMT4_ev = 0.00859907
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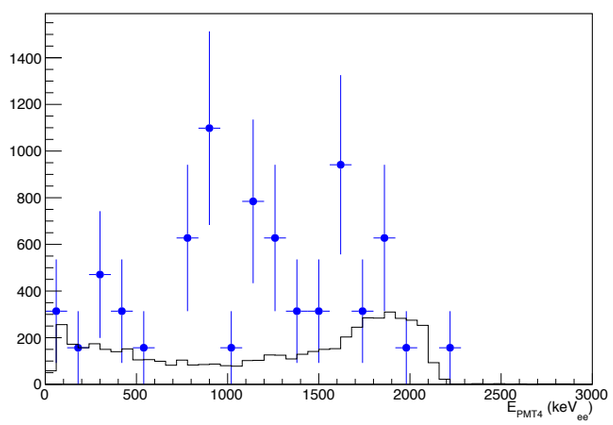


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Run_201

Run over 1025128 events
Found 30280 events in PMT4
Found 251 events in PMT4 + Wheel
Found 40 events in PMT4 + PMT0

Triples/Total = 0.000244847
Triples/PMT4_ev = 0.0082893
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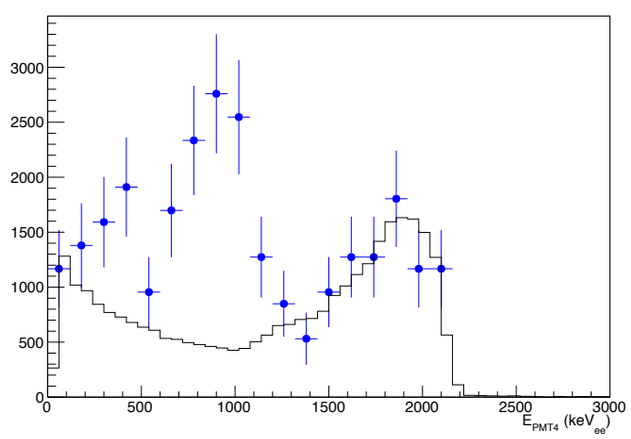

The temporal systematic trend is harder to see in the final triples yield (also due to the low statistics). But something can be seen in 199+200+201 dataset…

Hence it is still not clear if the ageing has dramatic effects in the triples yield

Should be convenient to run at lower currents (15nA) for the next test beam?