the forward photon detector system, rates

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LUXE weekly technical meetings

LUXE

Compton rates for 17.5 GeV

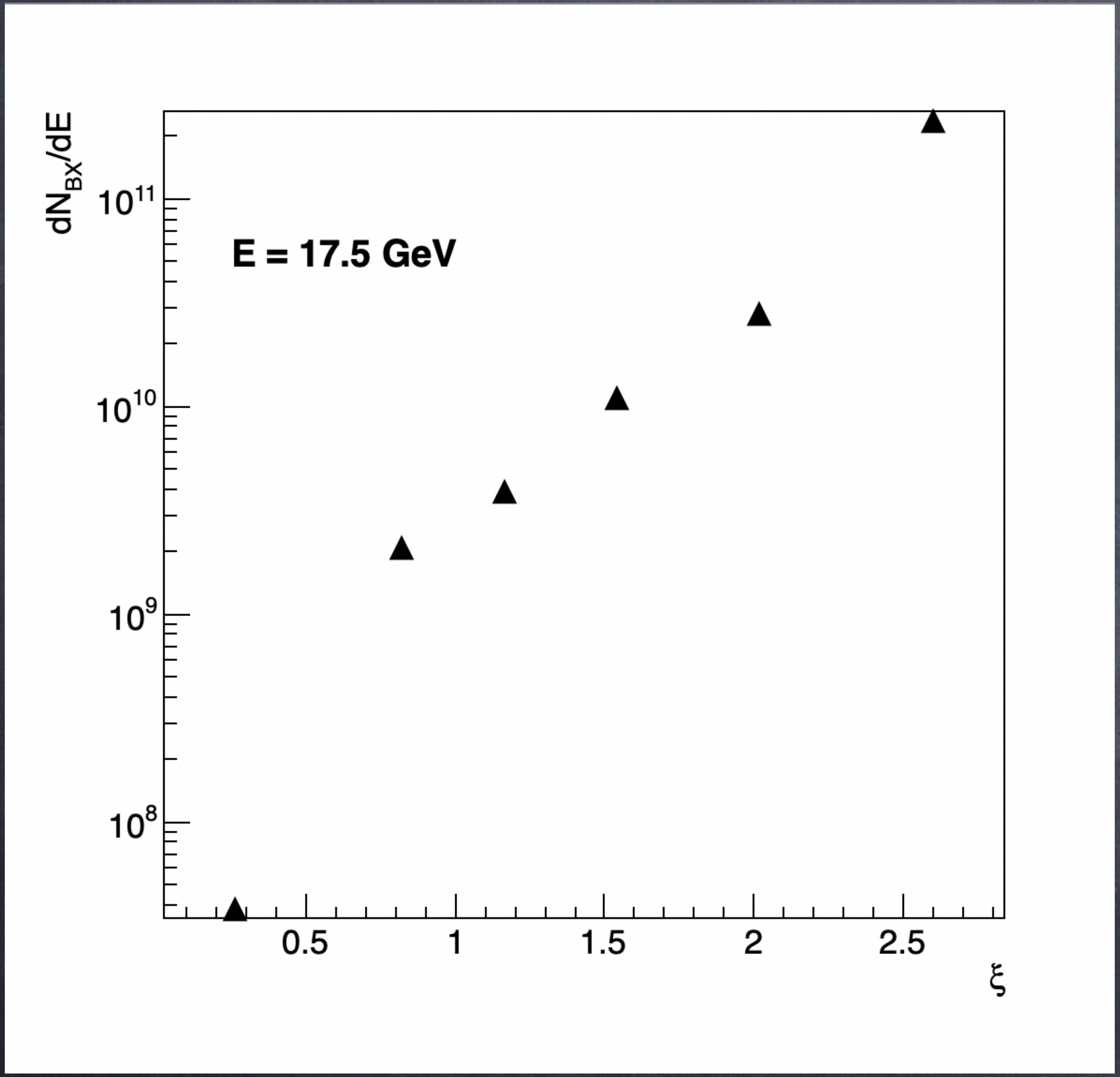
Pulse peak E, J	xi	N of photons in 10000 BX	weight	rate per BX
0.01	0.26	63753	6.0*10^6	**3.8*10^7**

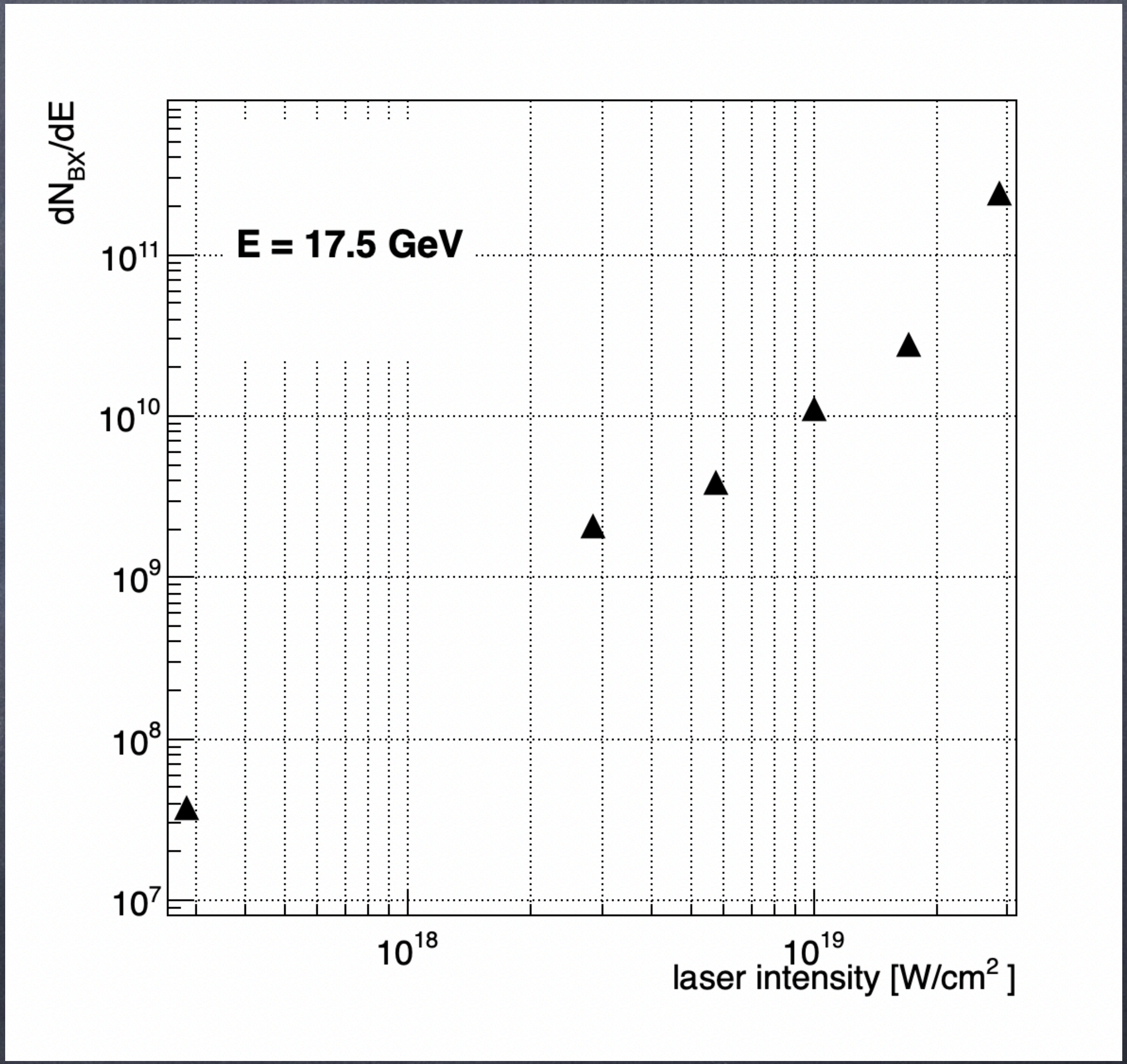
Pulse peak E, J	xi	N of photons in 1000 BX	weight	rate per BX
0.1	0.82	348682	6.0*10^6	**2.1*10^9**
0.2	1.16	643596	6.0*10^6	**3.9*10^9**
0.35	1.54	1881691	6.0*10^6	**1.12*10^10**

J / Pulse peak	xi	N of photons in 1000 BX	weight	rate per BX
0.6	2.02	389938	6.0*10^6 && 0.1	2.8*10^10
0.6	2.02	126674	0.1	12.67
0.6	2.02	4737459	6.0*10^6	**2.8*10^10**

J / Pulse peak	xi,	N of photons in 100 BX	weight	rate per BX
1.0	2.6	4334574	6.0*10^6 && 1.00	2.4*10^11
1.0	2.6	321775	1.00	3217.8
1.0	2.6	4012799	6.0*10^6	**2.4*10^11**

Number of true photons vs laser intensity or ξ

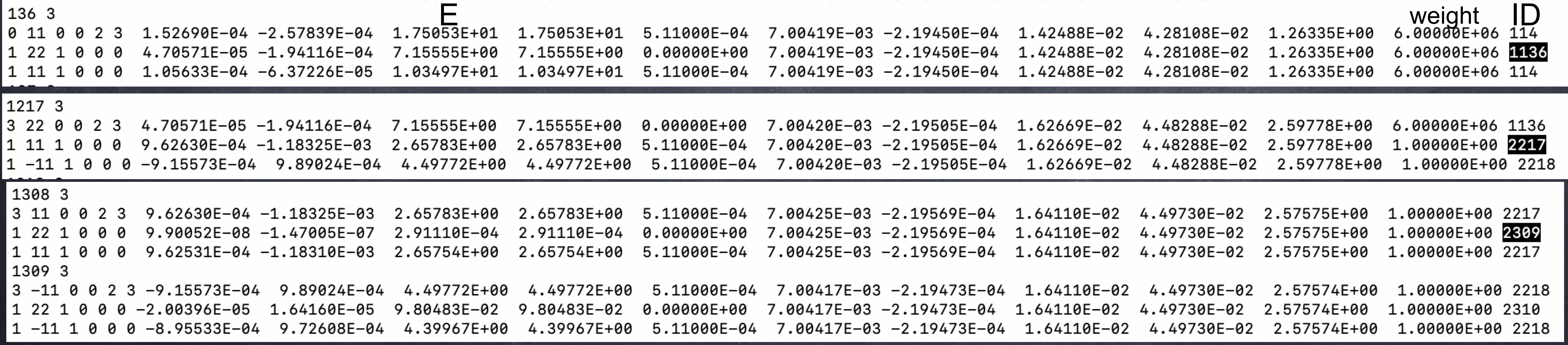




4th order process

Pulse peak E, J	xi	N of photons in 1000 BX	weight	rate per BX
0.01, 0.1	0.26, 0.82	0	0	0
0.2	1.16	75	0.001	7.5*10^-5
0.35	1.54	7884	0.01	0.08
0.6	2.02	126674	0.1	12.67

J / Pulse peak	xi	N of photons in 100 BX	weight	rate per BX
1.0	2.6	321775	1.00	3217.8



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1 22 1 0 0 0  4.70571E-05 -1.94116E-04  7.15555E+00  7.15555E+00  0.00000E+00  7.00419E-03 -2.19450E-04  1.42488E-02  4.28108E-02  1.26335E+00  6.00000E+06 1136
1 11 1 0 0 0  1.05633E-04 -6.37226E-05  1.03497E+01  1.03497E+01  5.11000E-04  7.00419E-03 -2.19450E-04  1.42488E-02  4.28108E-02  1.26335E+00  6.00000E+06 114
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1 11 1 0 0 0  9.62630E-04 -1.18325E-03  2.65783E+00  2.65783E+00  5.11000E-04  7.00420E-03 -2.19505E-04  1.62669E-02  4.48288E-02  2.59778E+00  1.00000E+00 2217
1 -11 1 0 0 0 -9.15573E-04  9.89024E-04  4.49772E+00  4.49772E+00  5.11000E-04  7.00420E-03 -2.19505E-04  1.62669E-02  4.48288E-02  2.59778E+00  1.00000E+00 2218
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1 11 1 0 0 0  9.62531E-04 -1.18310E-03  2.65754E+00  2.65754E+00  5.11000E-04  7.00425E-03 -2.19569E-04  1.64110E-02  4.49730E-02  2.57575E+00  1.00000E+00 2217
1309 3
3 -11 0 0 2 3 -9.15573E-04  9.89024E-04  4.49772E+00  4.49772E+00  5.11000E-04  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2218
1 22 1 0 0 0 -2.00396E-05  1.64160E-05  9.80483E-02  9.80483E-02  0.00000E+00  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2310
1 -11 1 0 0 0 -8.95533E-04  9.72608E-04  4.39967E+00  4.39967E+00  5.11000E-04  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2218
```

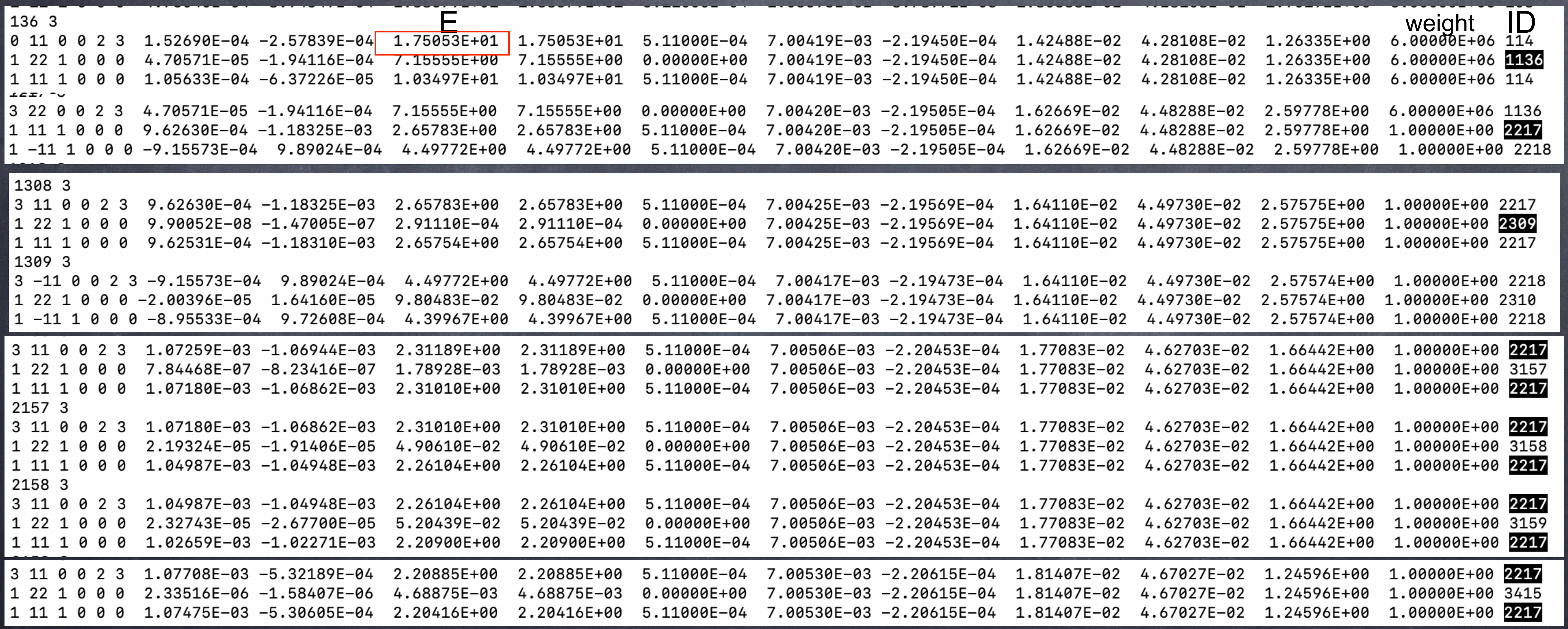
e- (ID1136) 17.5 GeV ⟶ Compton γ (ID1136)

e- (ID2217)___γ (ID2309)

e+(ID2218)___γ (ID2310)

4th order process: example

J / Pulse peak	xi	N of photons in 100 BX	weight	rate per BX
1.0	2.6	321775	1.00	3217.8



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1 22 1 0 0 0  4.70571E-05 -1.94116E-04  7.15555E+00  7.15555E+00  0.00000E+00  7.00419E-03 -2.19450E-04  1.42488E-02  4.28108E-02  1.26335E+00  6.00000E+06 1136
1 11 1 0 0 0  1.05633E-04 -6.37226E-05  1.03497E+01  1.03497E+01  5.11000E-04  7.00419E-03 -2.19450E-04  1.42488E-02  4.28108E-02  1.26335E+00  6.00000E+06 114

3 22 0 0 2 3  4.70571E-05 -1.94116E-04  7.15555E+00  7.15555E+00  0.00000E+00  7.00420E-03 -2.19505E-04  1.62669E-02  4.48288E-02  2.59778E+00  6.00000E+06 1136
1 11 1 0 0 0  9.62630E-04 -1.18325E-03  2.65783E+00  2.65783E+00  5.11000E-04  7.00420E-03 -2.19505E-04  1.62669E-02  4.48288E-02  2.59778E+00  1.00000E+00 2217
1 -11 1 0 0 0 -9.15573E-04  9.89024E-04  4.49772E+00  4.49772E+00  5.11000E-04  7.00420E-03 -2.19505E-04  1.62669E-02  4.48288E-02  2.59778E+00  1.00000E+00 2218

1308 3
3 11 0 0 2 3  9.62630E-04 -1.18325E-03  2.65783E+00  2.65783E+00  5.11000E-04  7.00425E-03 -2.19569E-04  1.64110E-02  4.49730E-02  2.57575E+00  1.00000E+00 2217
1 22 1 0 0 0  9.90052E-08 -1.47005E-07  2.91110E-04  2.91110E-04  0.00000E+00  7.00425E-03 -2.19569E-04  1.64110E-02  4.49730E-02  2.57575E+00  1.00000E+00 2309
1 11 1 0 0 0  9.62531E-04 -1.18310E-03  2.65754E+00  2.65754E+00  5.11000E-04  7.00425E-03 -2.19569E-04  1.64110E-02  4.49730E-02  2.57575E+00  1.00000E+00 2217
1309 3
3 -11 0 0 2 3 -9.15573E-04  9.89024E-04  4.49772E+00  4.49772E+00  5.11000E-04  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2218
1 22 1 0 0 0 -2.00396E-05  1.64160E-05  9.80483E-02  9.80483E-02  0.00000E+00  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2310
1 -11 1 0 0 0 -8.95533E-04  9.72608E-04  4.39967E+00  4.39967E+00  5.11000E-04  7.00417E-03 -2.19473E-04  1.64110E-02  4.49730E-02  2.57574E+00  1.00000E+00 2218

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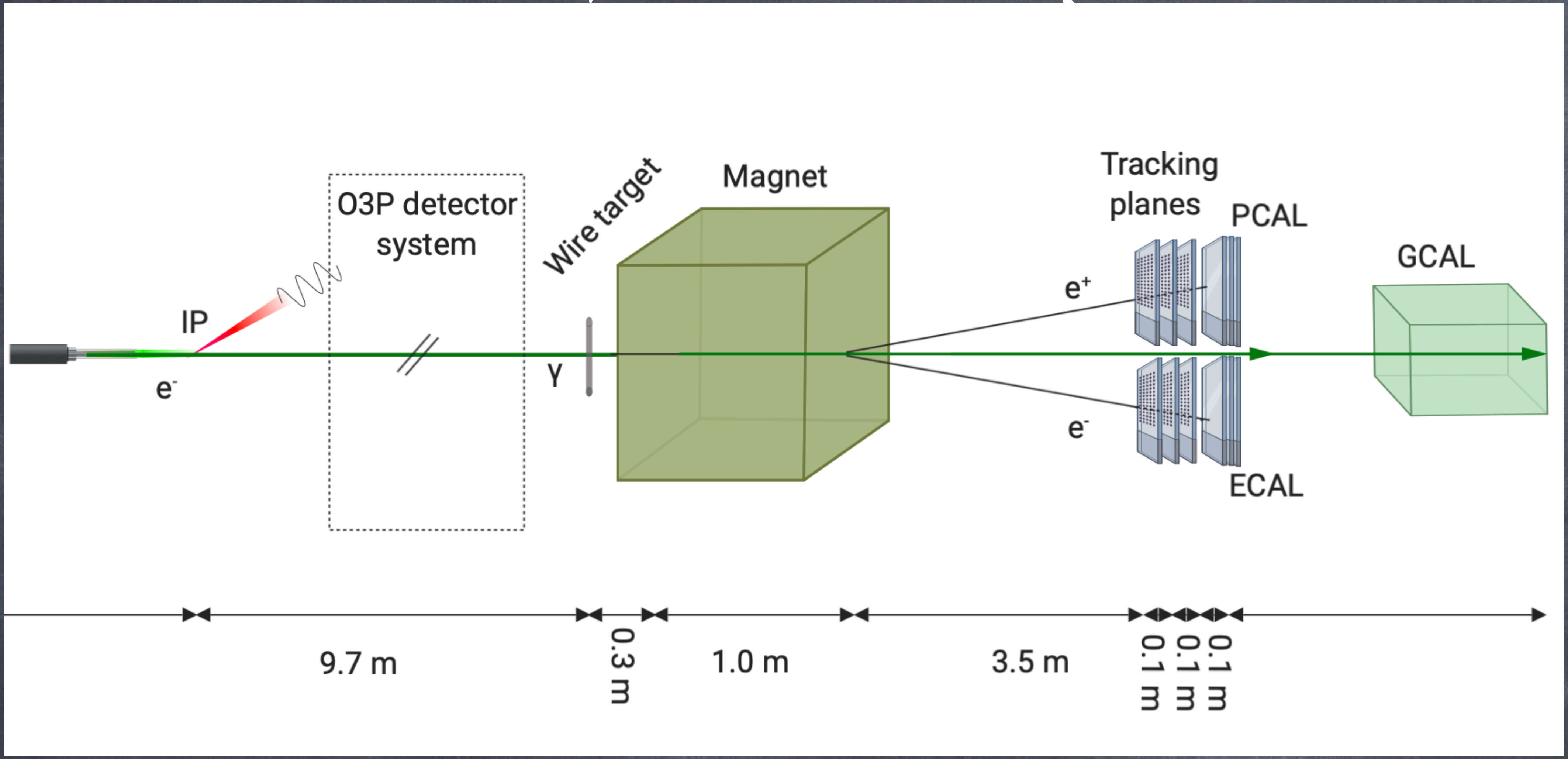
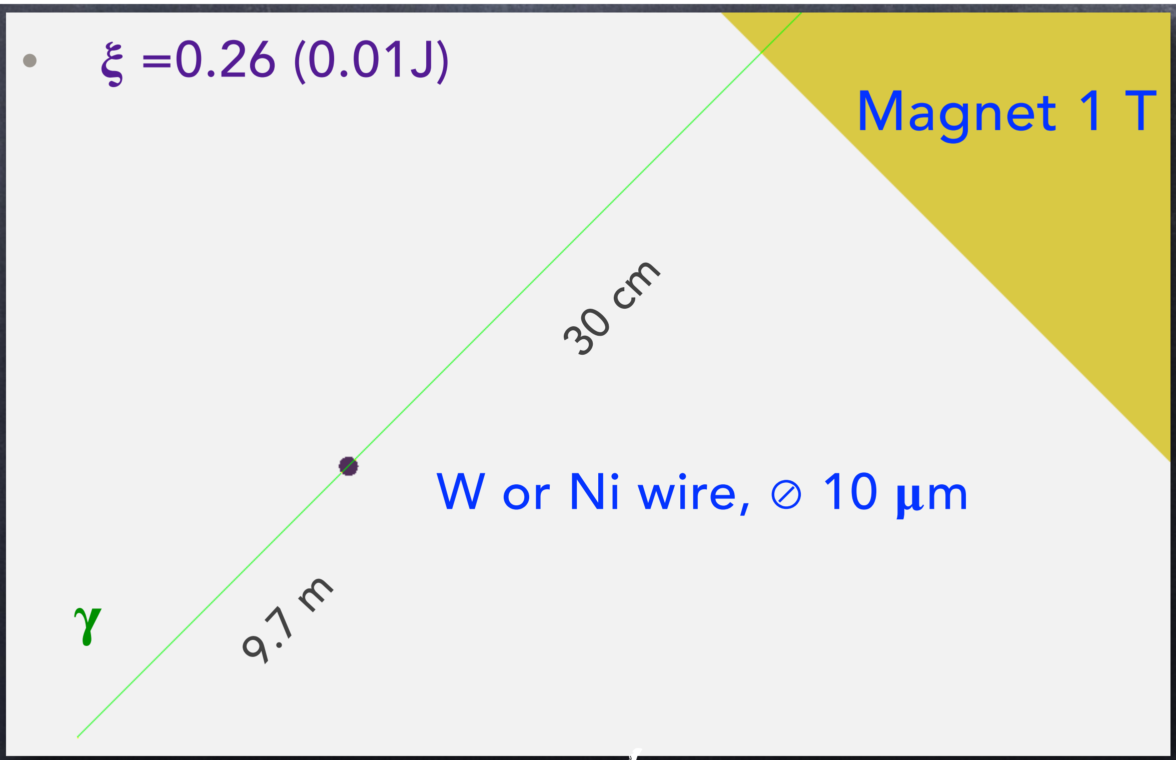
γ (ID3415)
γ (ID3159)
γ (ID3158)
γ (ID3157)
e- (ID2217) — γ (ID2309)
e- (ID114) 17.5 GeV → Compton γ (ID1136)
e+(ID2218) — γ (ID2310)

Schema of the experiment



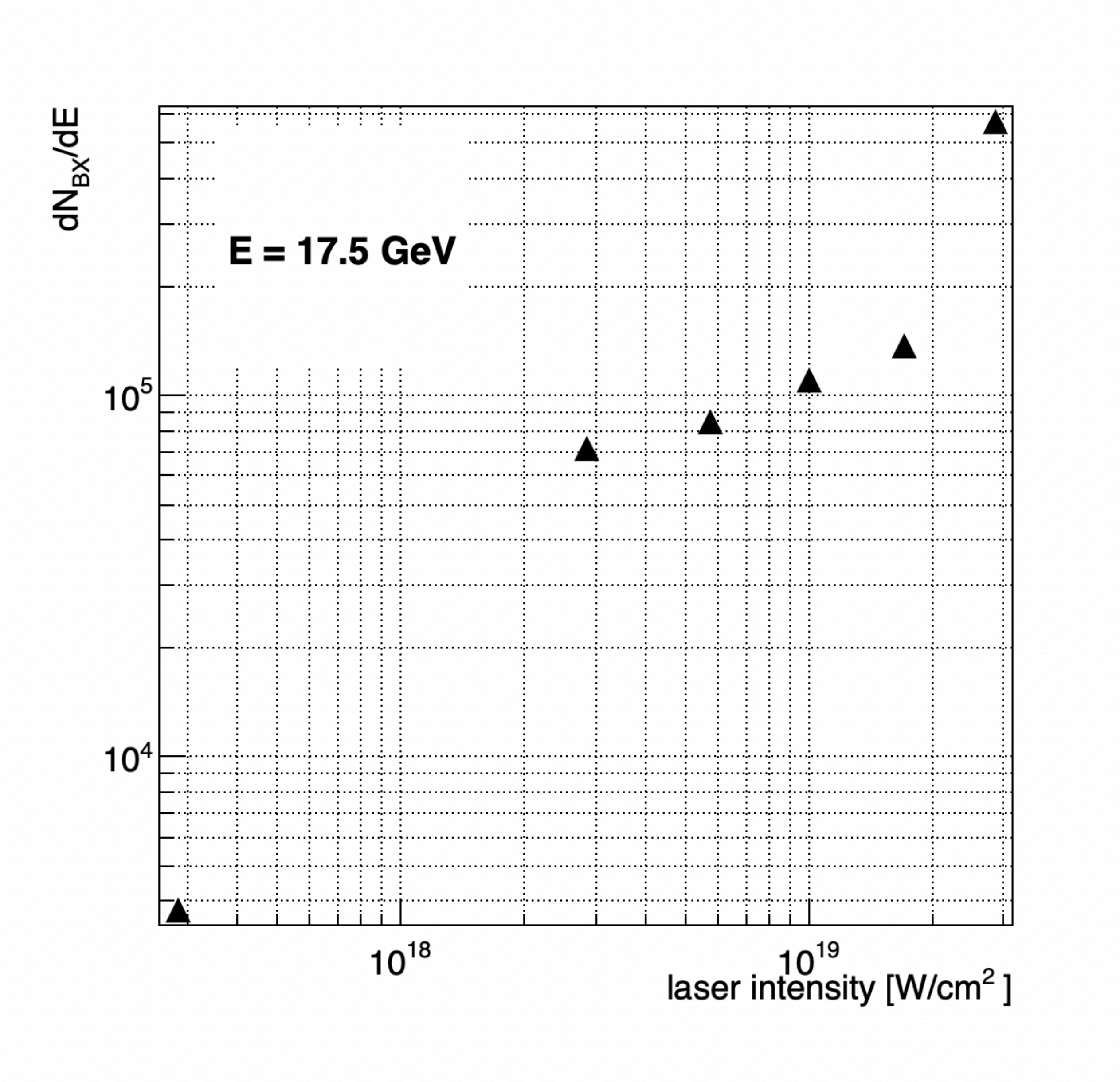


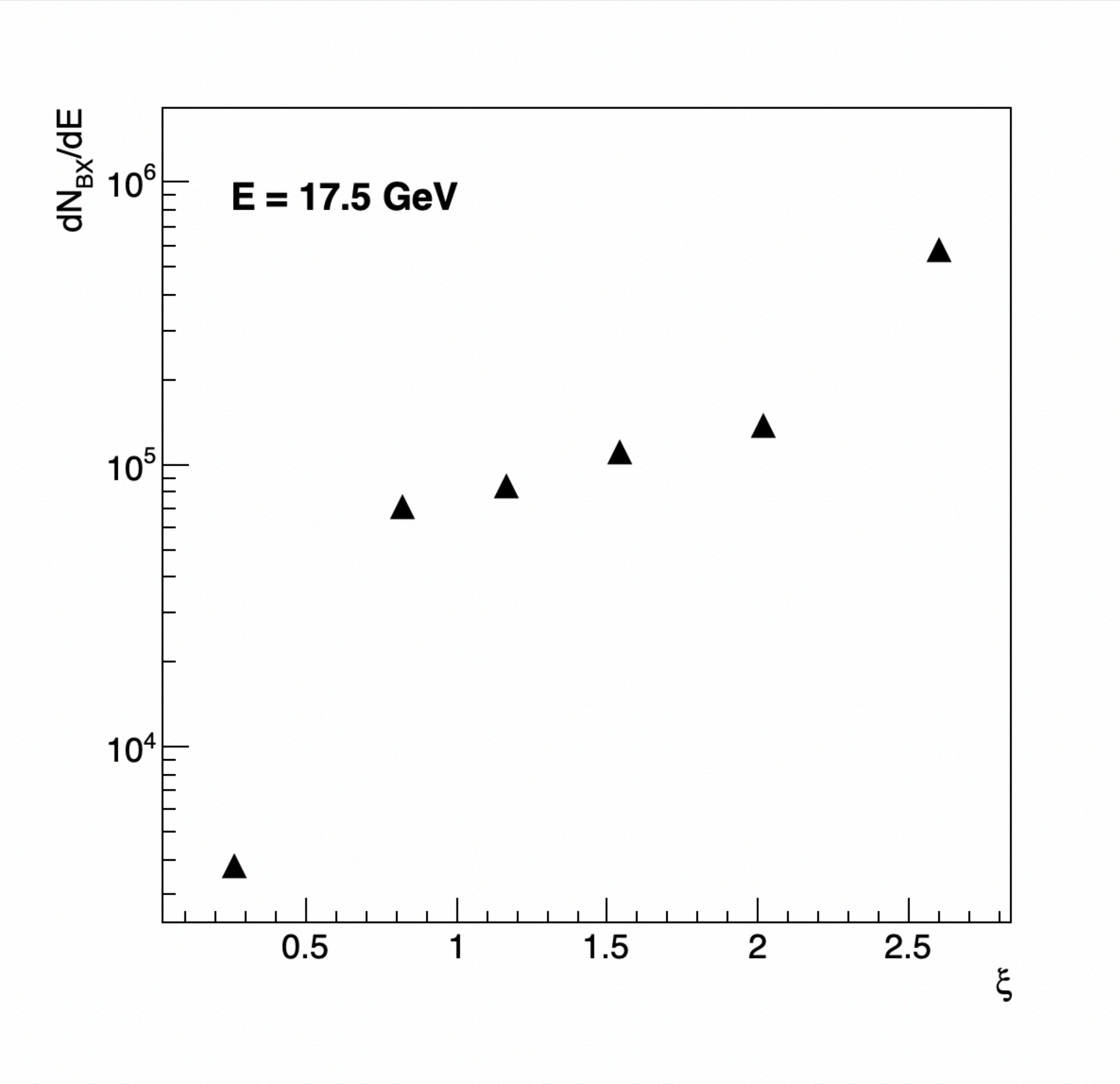
- ξ =0.26 (0.01J)

Geant4 simulation for the W wire (d_W, 10 um) converter

And electron energy of 17.5 GeV

IL, J	ξ	e+
0.01	0.26	3794
0.1	0.82	71376
0.2	1.16	84524
0.35	1.54	110399
0.6	2.02	136779
1.0	2.60	574668





Back up

Trident rates

xi, J	N of positrons in 1000 BX	weight	rate per BX
0.1	0		0
0.2	4	0.01	4*10^-5
0.2	42	0.001	4.2*10^-5
0.35	621	0.01	0.6*10^-2
0.6	4582	0.1	0.46

xi, J	N of positrons in 100 BX	weight	rate per BX
1.0	6107	1.0	61.07