Photon flux measurements

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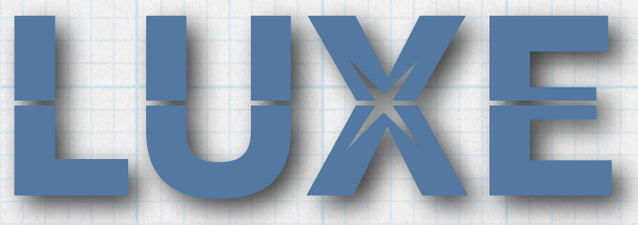
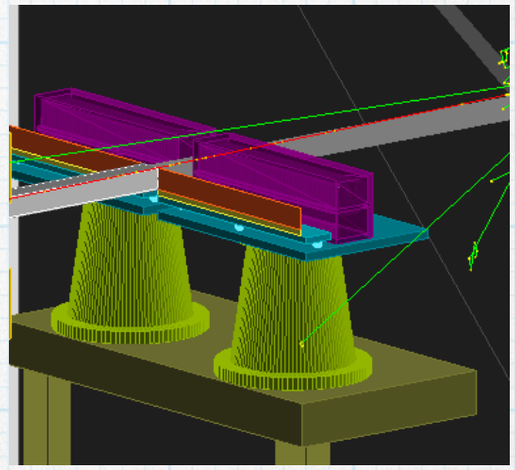
8/12/20
LUXE simulation meeting



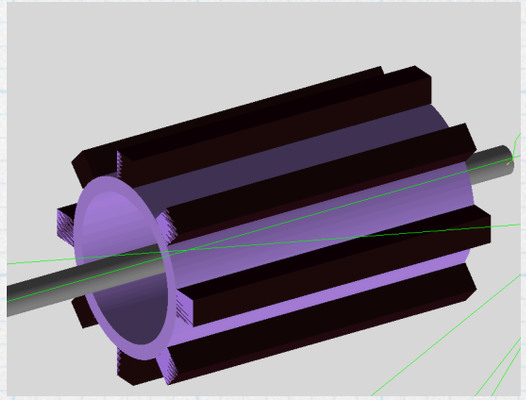
Tasks

To measure total flux of photons

- the technologies:
  a) conversion detector



b) backscattering calorimeter

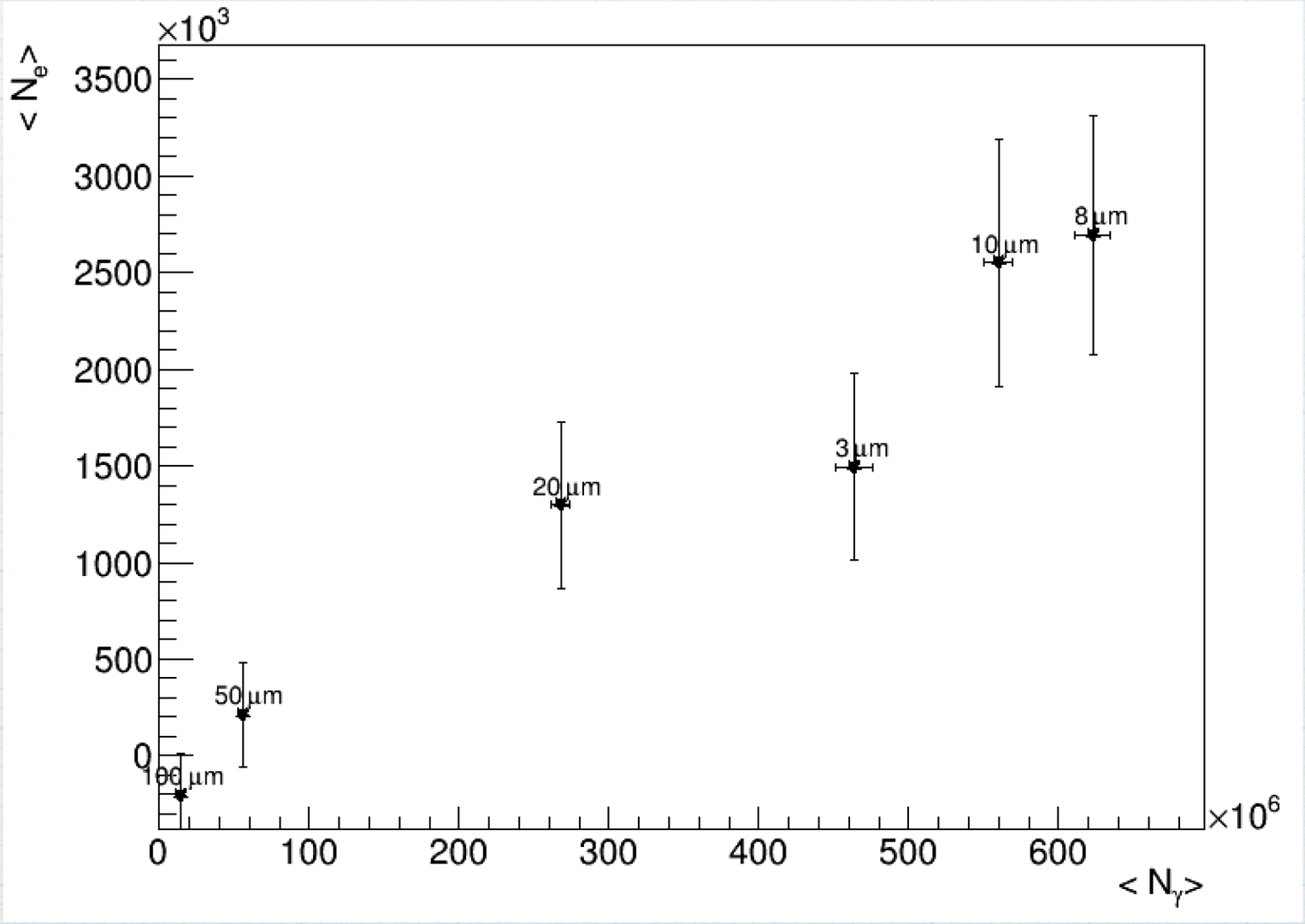


For the CDR
a) quantify how well a) and b) can measure the flux and above some threshold =>
show relative resolution on photon flux of the two technologies as function of number of photons

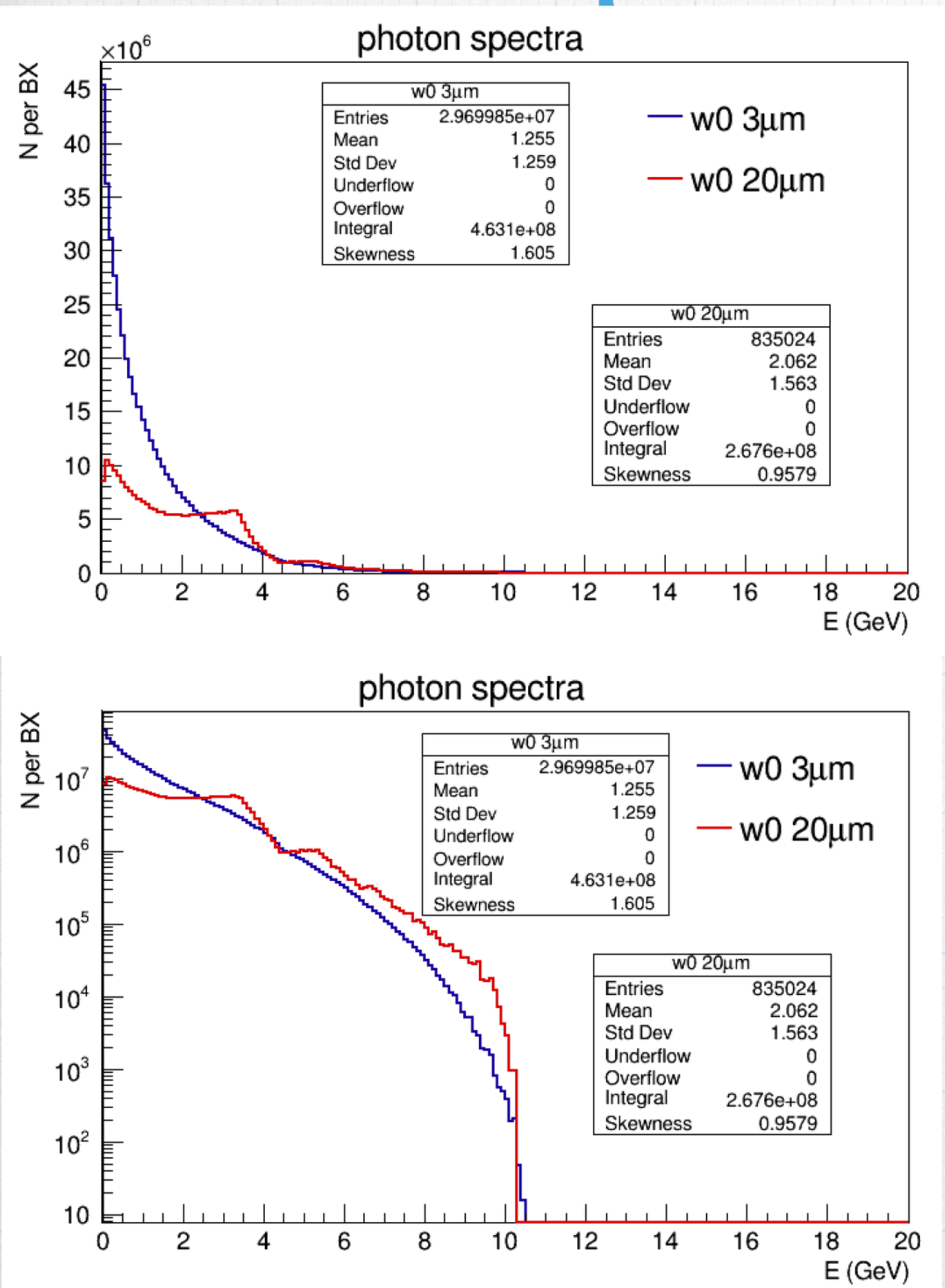
photon flux for the lanes spectrometer

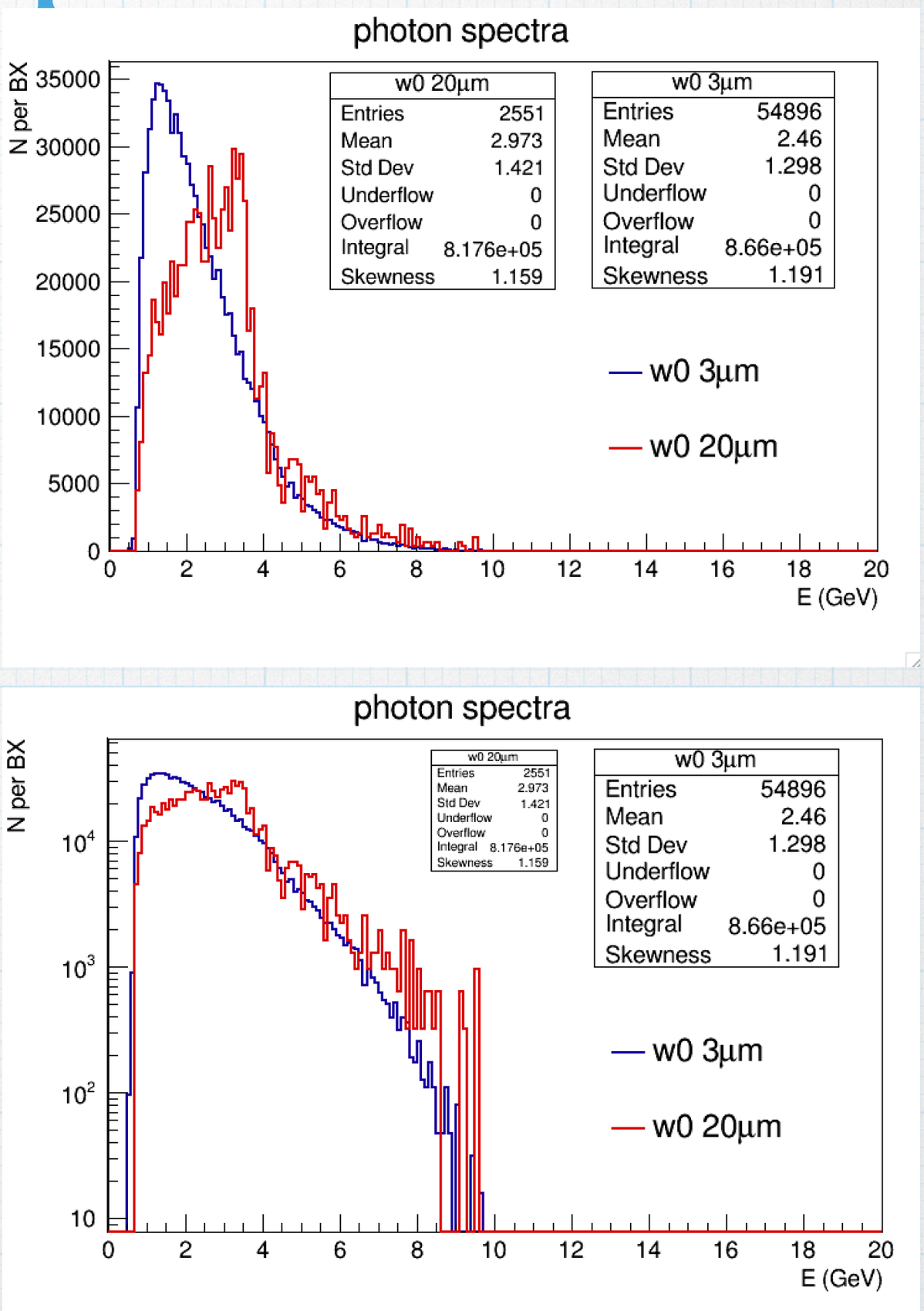
JETI40, e-laser, 16.5GeV, w0=3, 8, 10, 20, 50, 100μm

Experiment Config	$w_0 = 3\mu$m	3.5μm	4.0μm	4.5μm	5.0μm	6.5μm	8.0μm
peak SQED ξ	5.12	4.44	3.88	3.45	3.1	2.39	1.94
peak SQED χ (16.5 GeV)	0.9	0.79	0.69	0.61	0.55	0.42	0.34
JETI40 e-laser 16.5 GeV	10000	6000	5994	6000	6000		10000



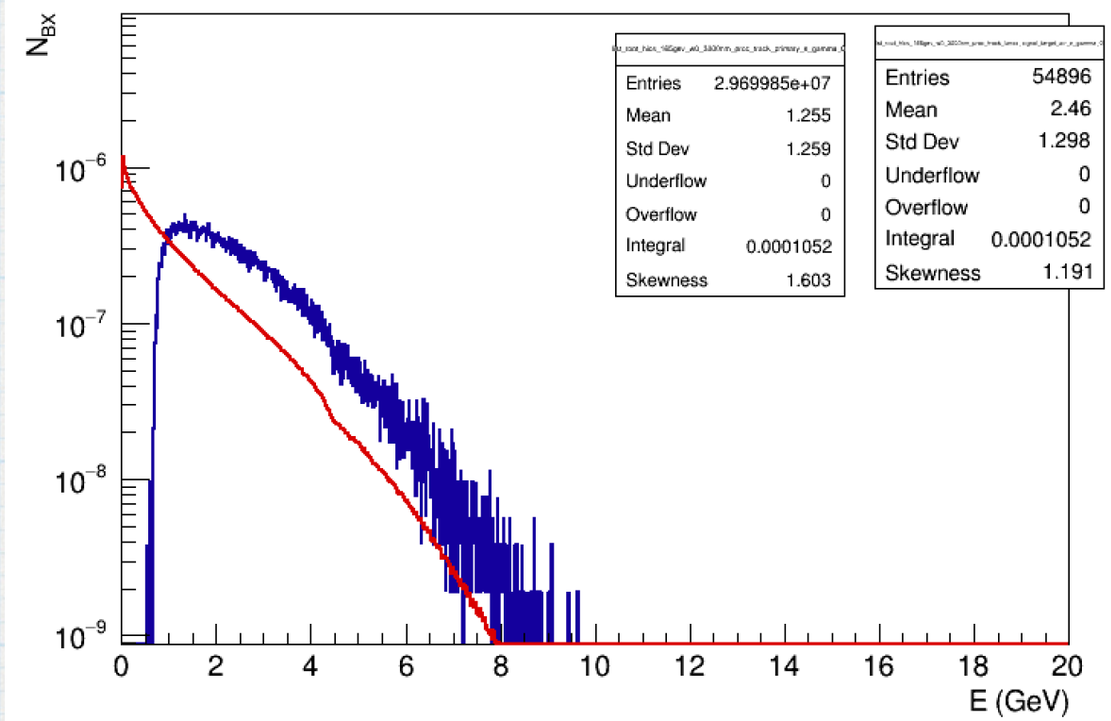
photon spectra

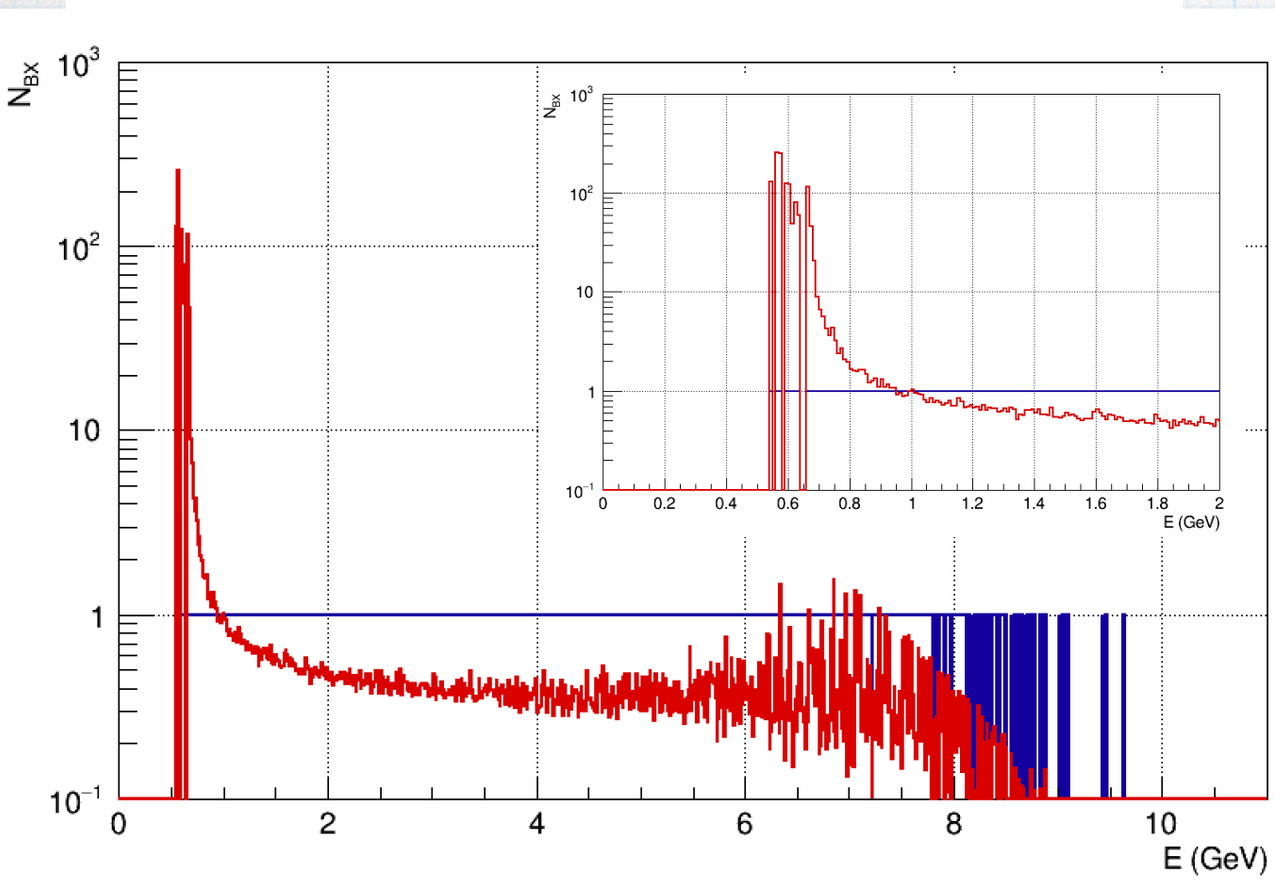




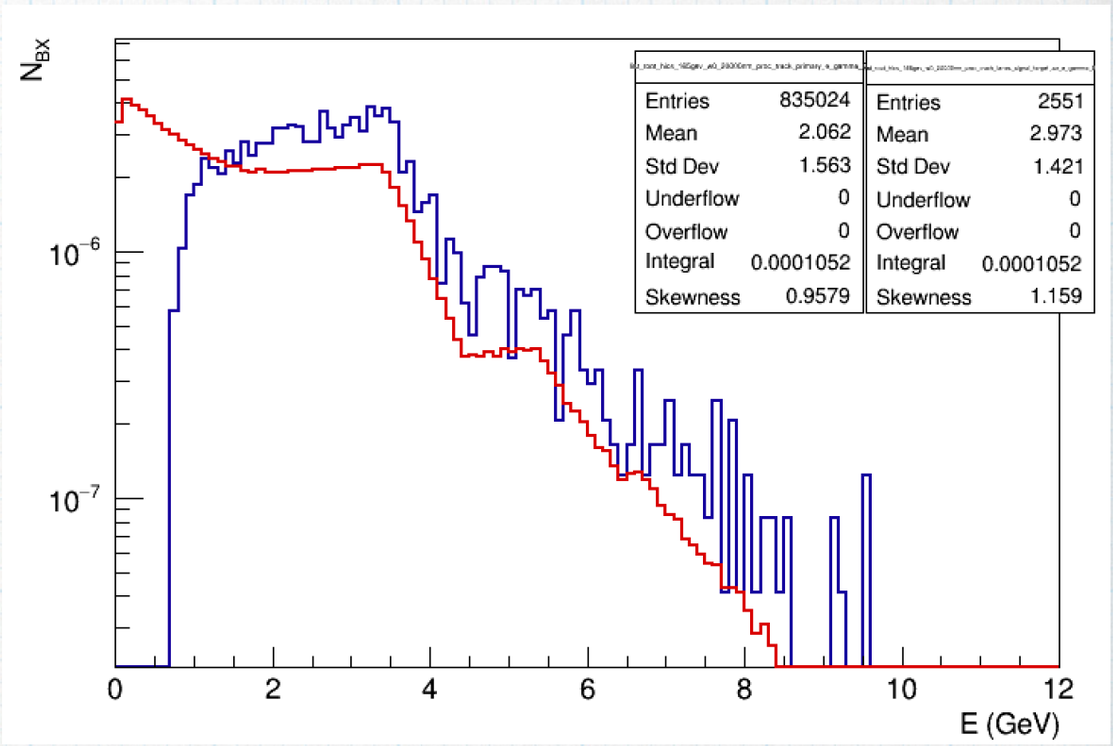
Ratio: true photon/signal

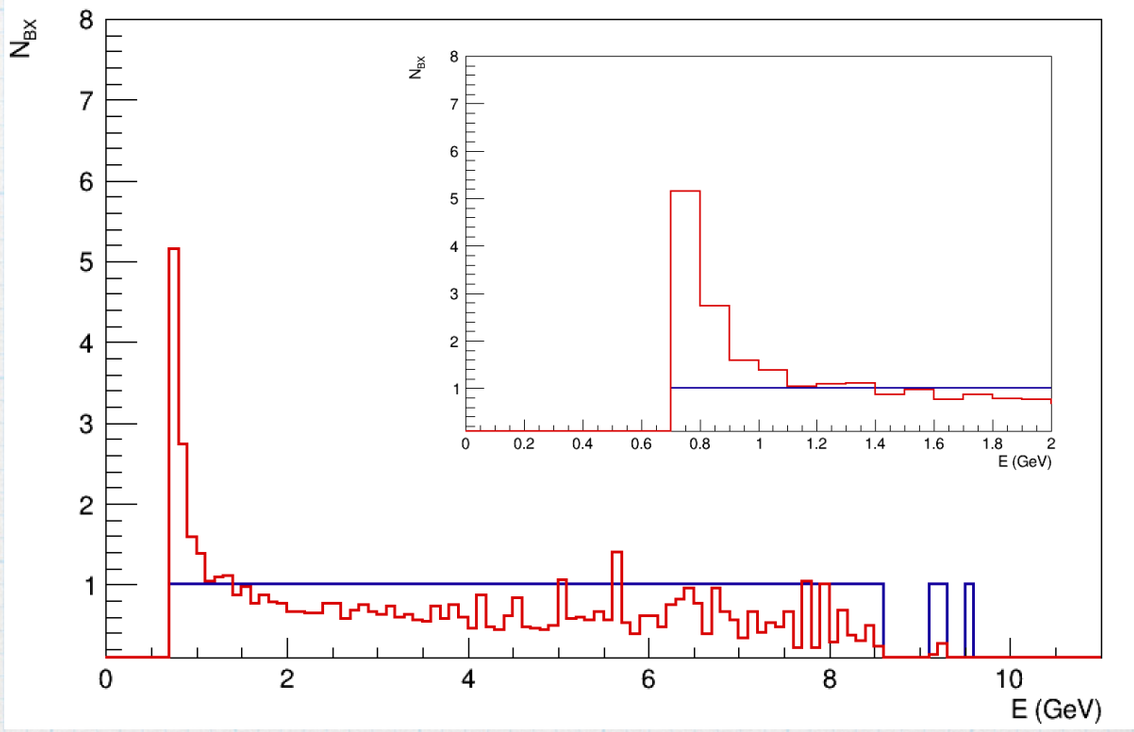
JET140, e-laser, 16.5GeV, w0=3 μm





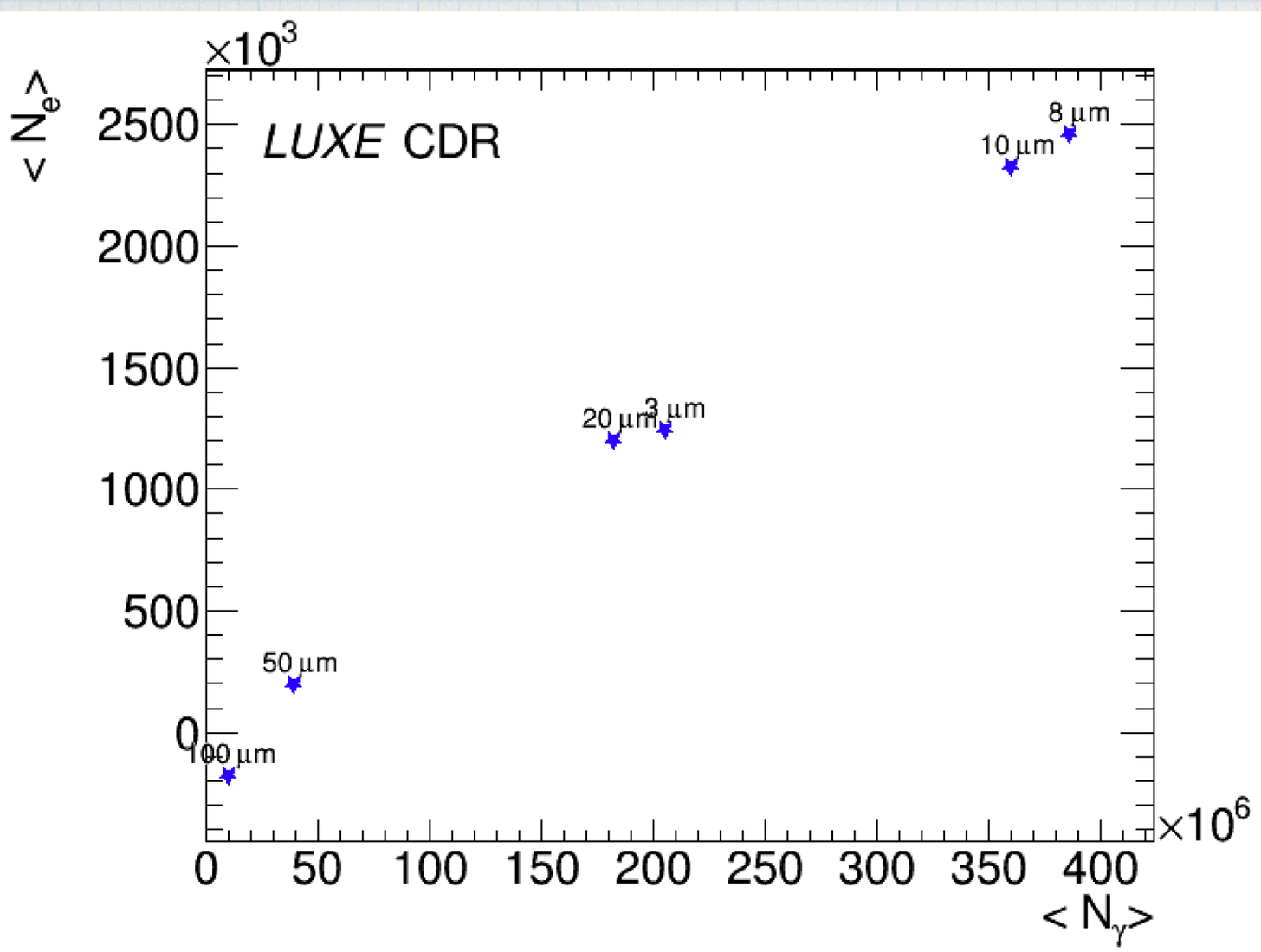
JET140, e-laser, 16.5GeV, w0=20 μm

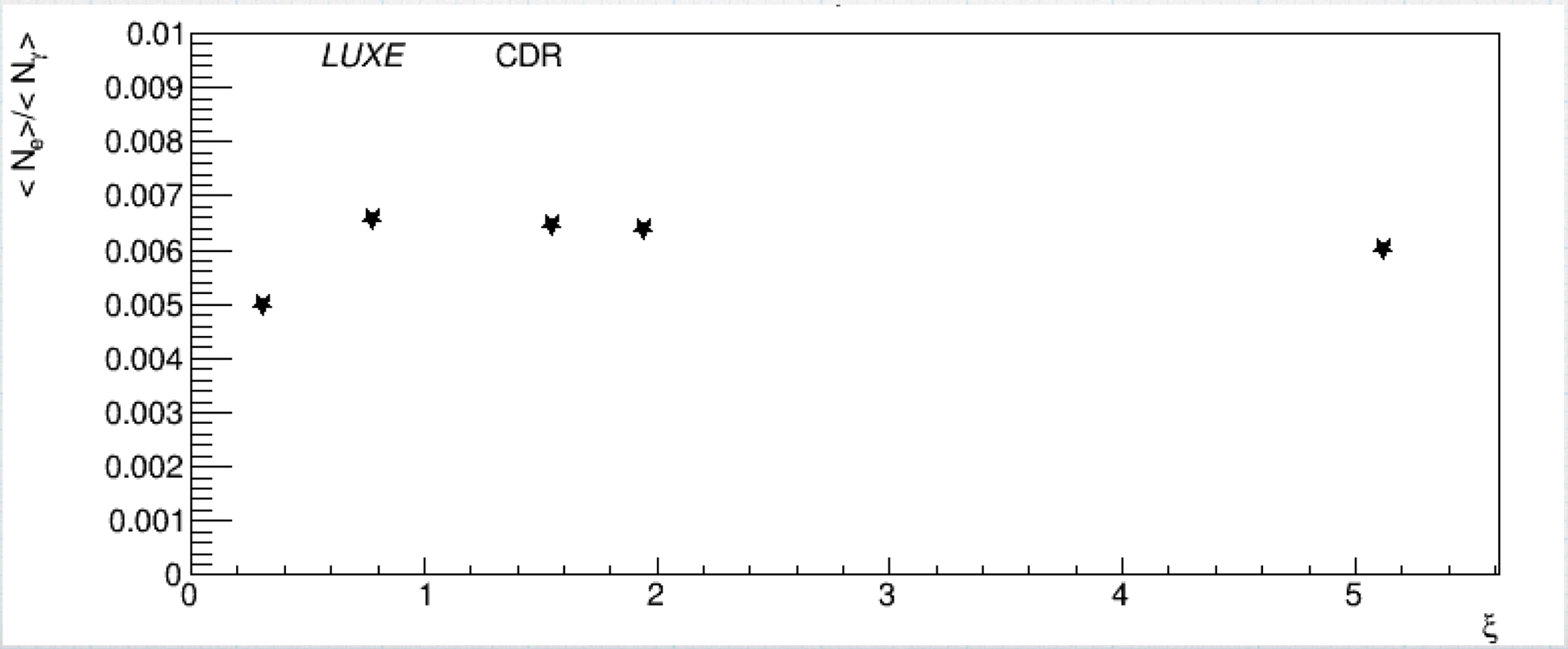




the photon flux

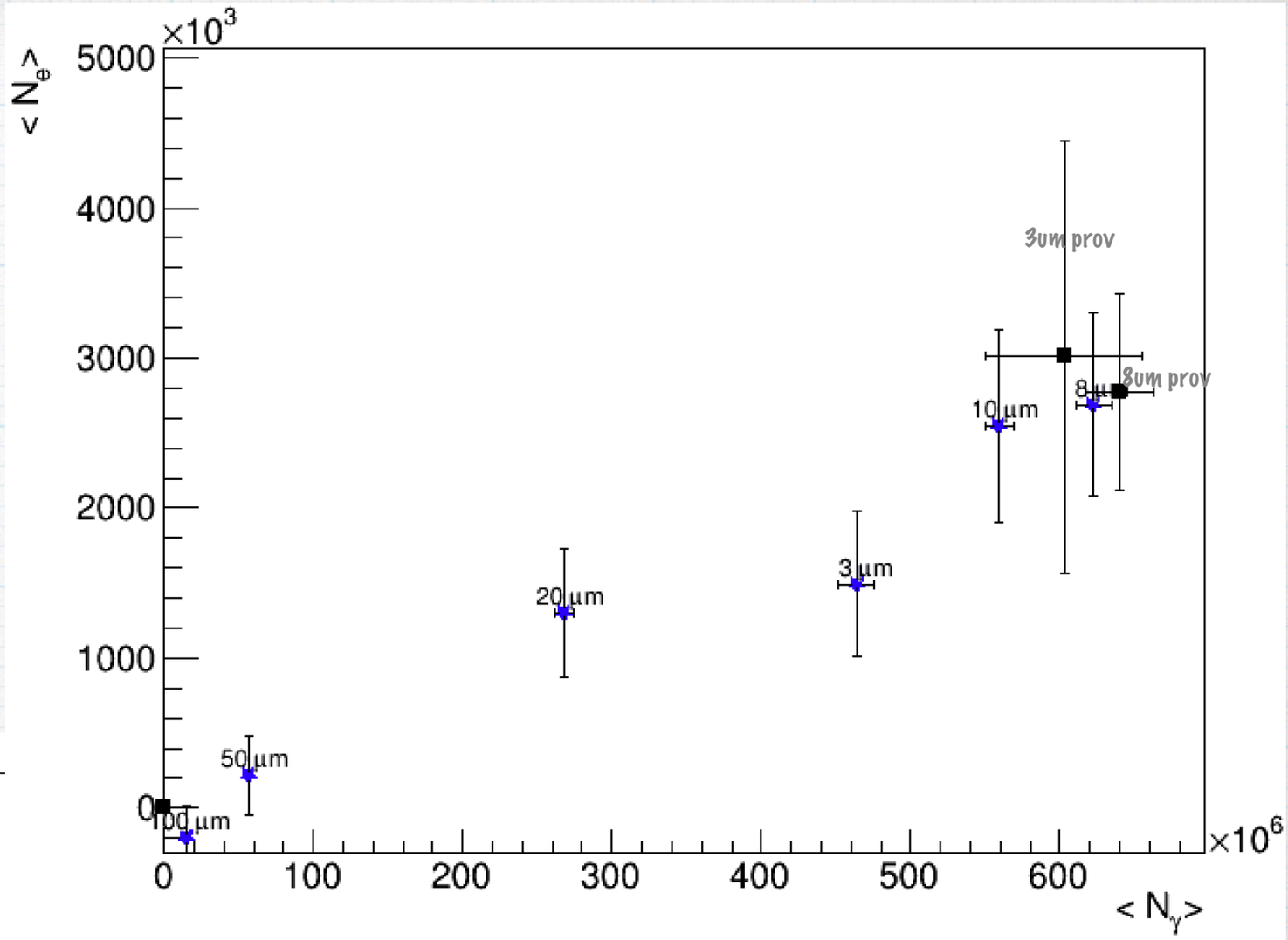
with a threshold above 1 GeV the errors are small as given as RMS/√<N>



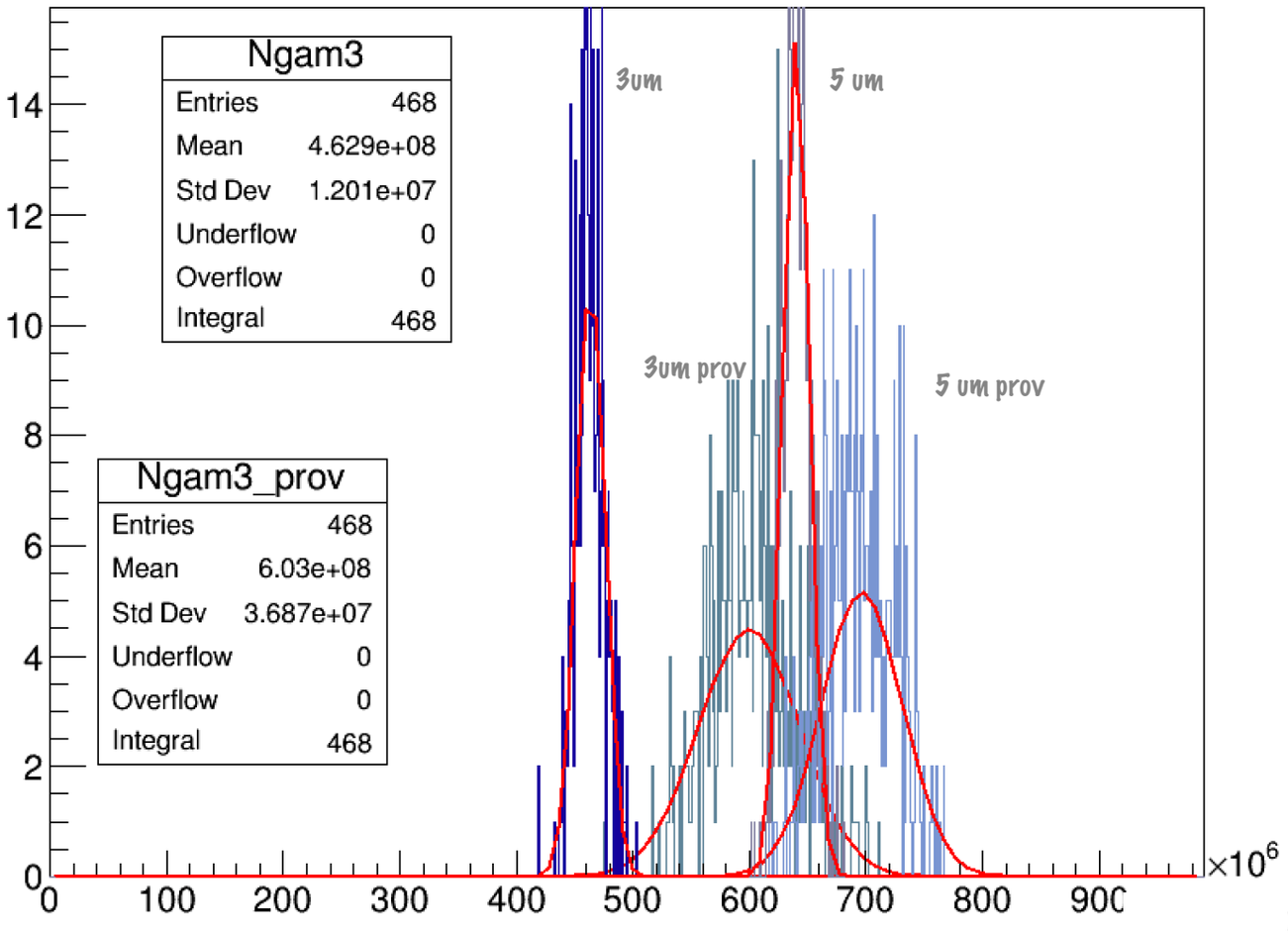


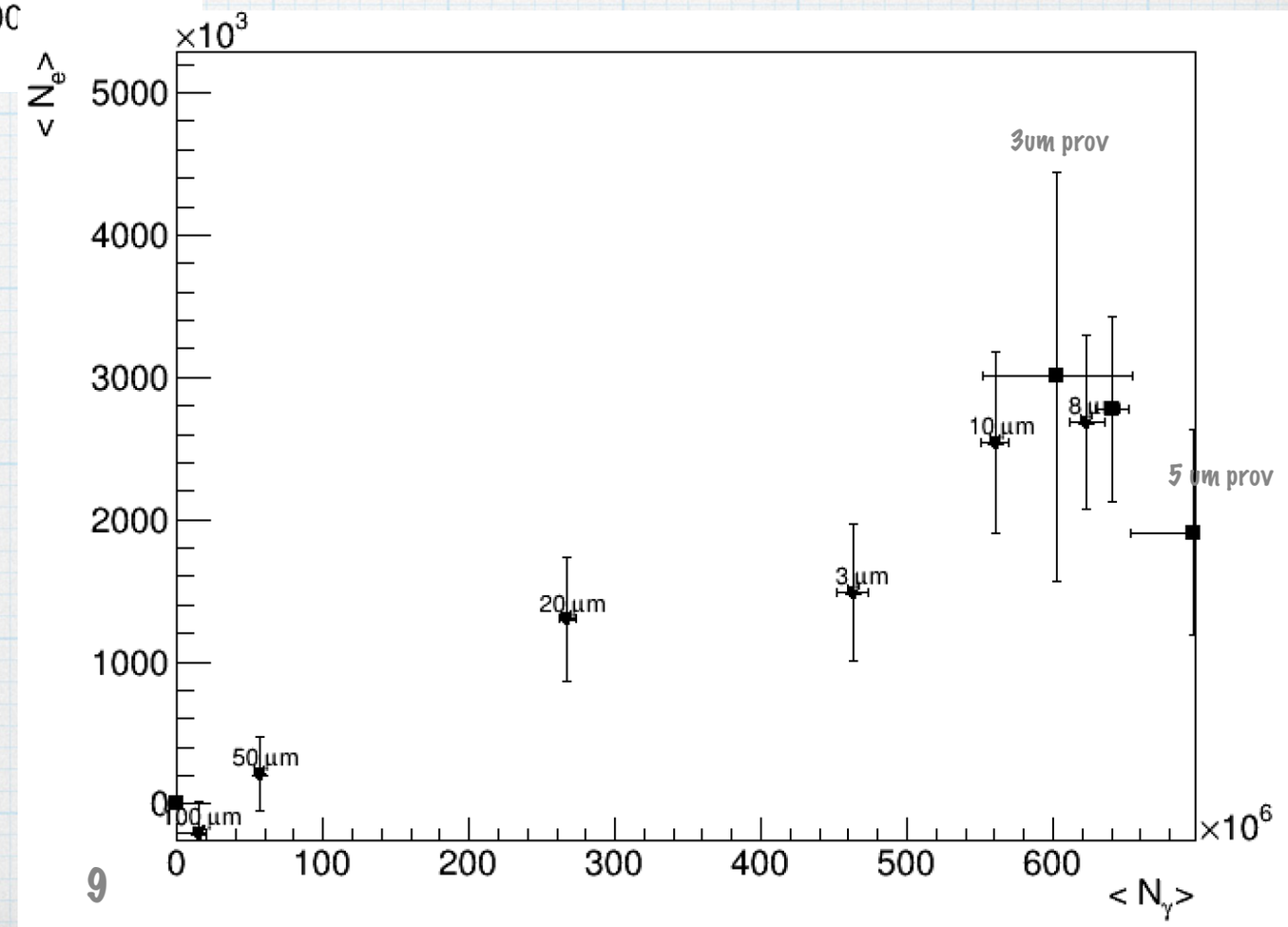
Back up


×10^3
3 µm
prov 3 µm
8 µm
prov 8 µm
10 µm
20 µm
50 µm
100 µm
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
100
200
300
400
500
600
700
800
900
1000
×10^6
N

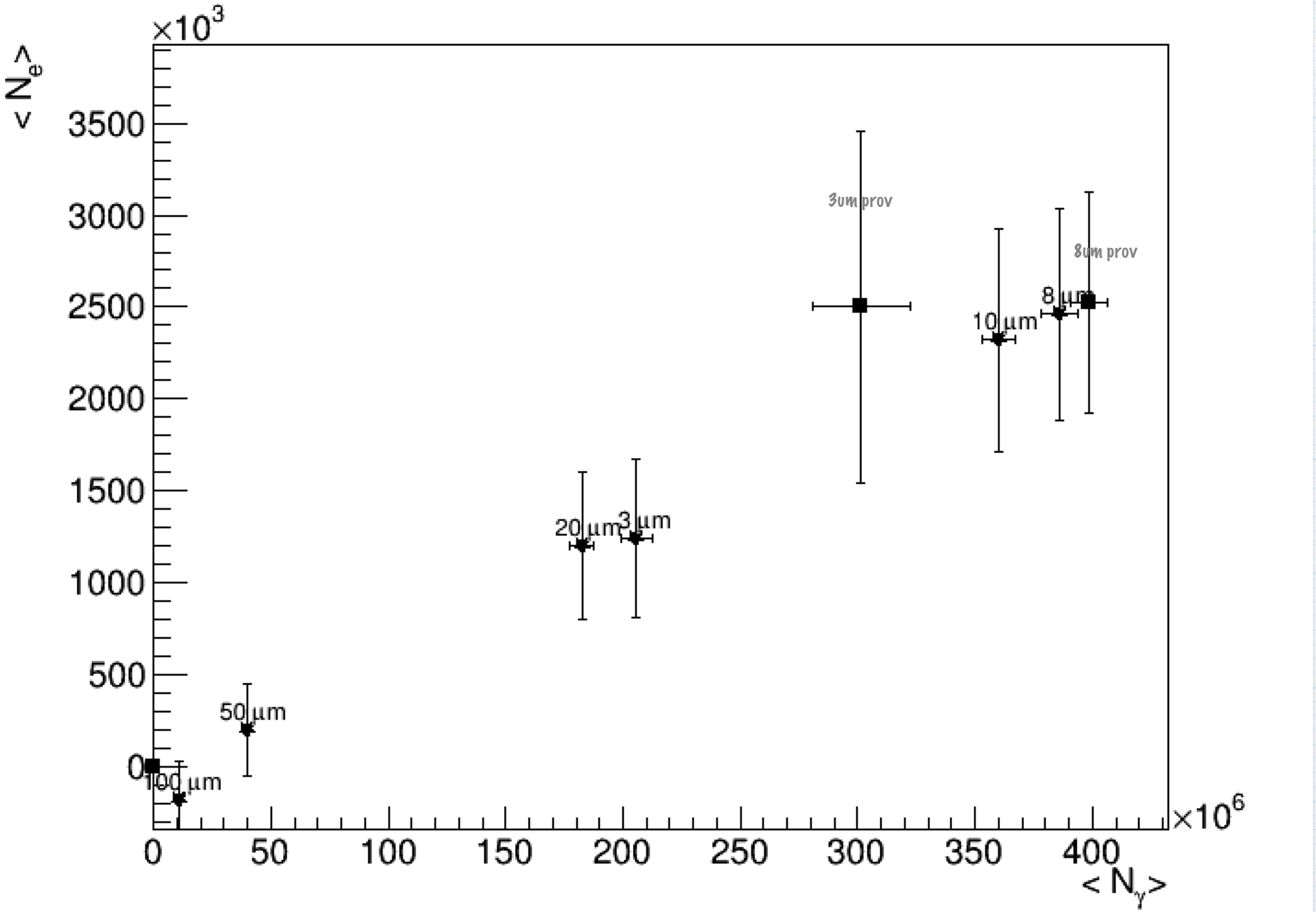

×10^3
5000
4000
3000
2000
1000
0
3um prov
8 µm
3um prov
10 µm
3 µm
20 µm
50 µm
100 µm
0
100
200
300
400
500
600
×10^6
< N_γ >
< N_e >
v

Previous vs "provisional" JET140, e-laser, 16.5GeV, w0=3 & 5 μm

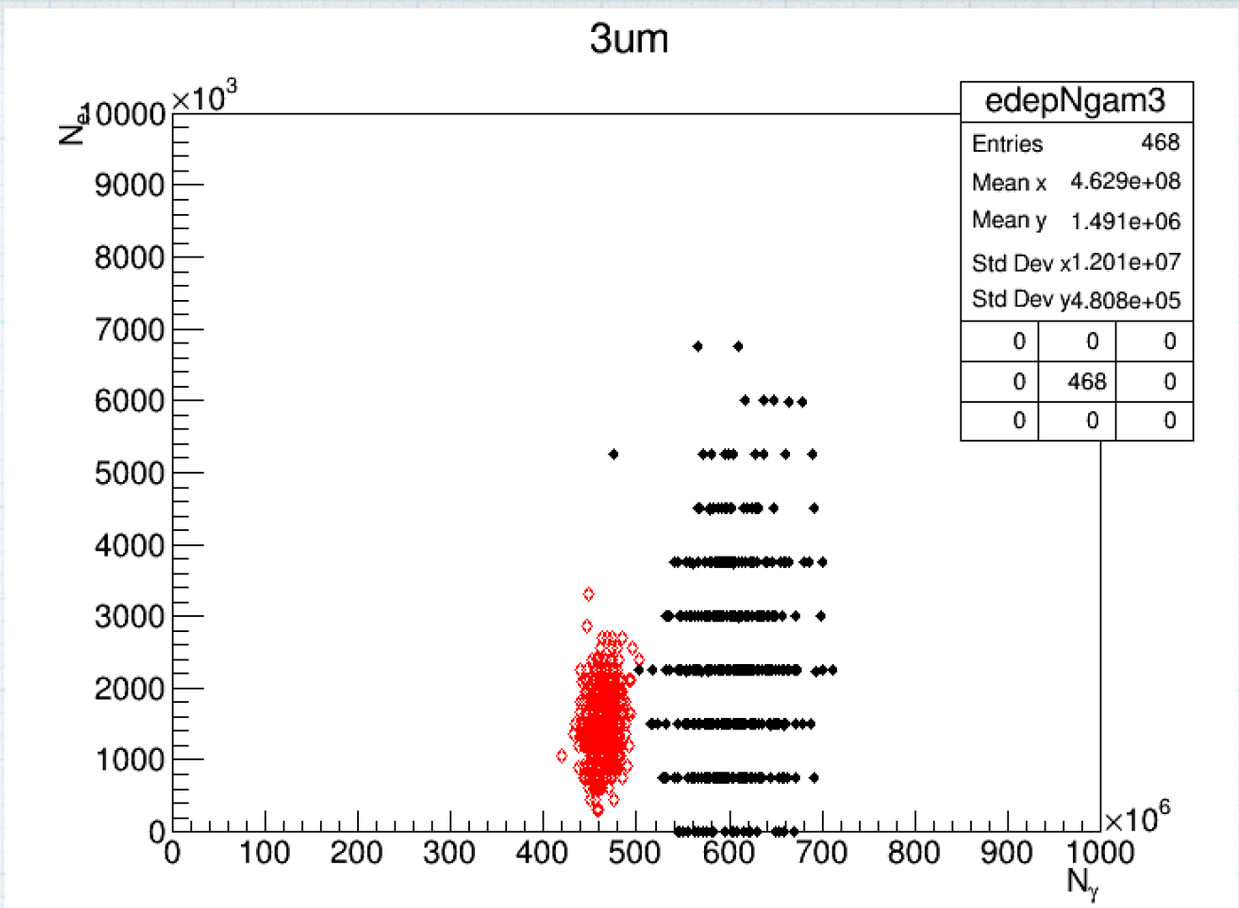


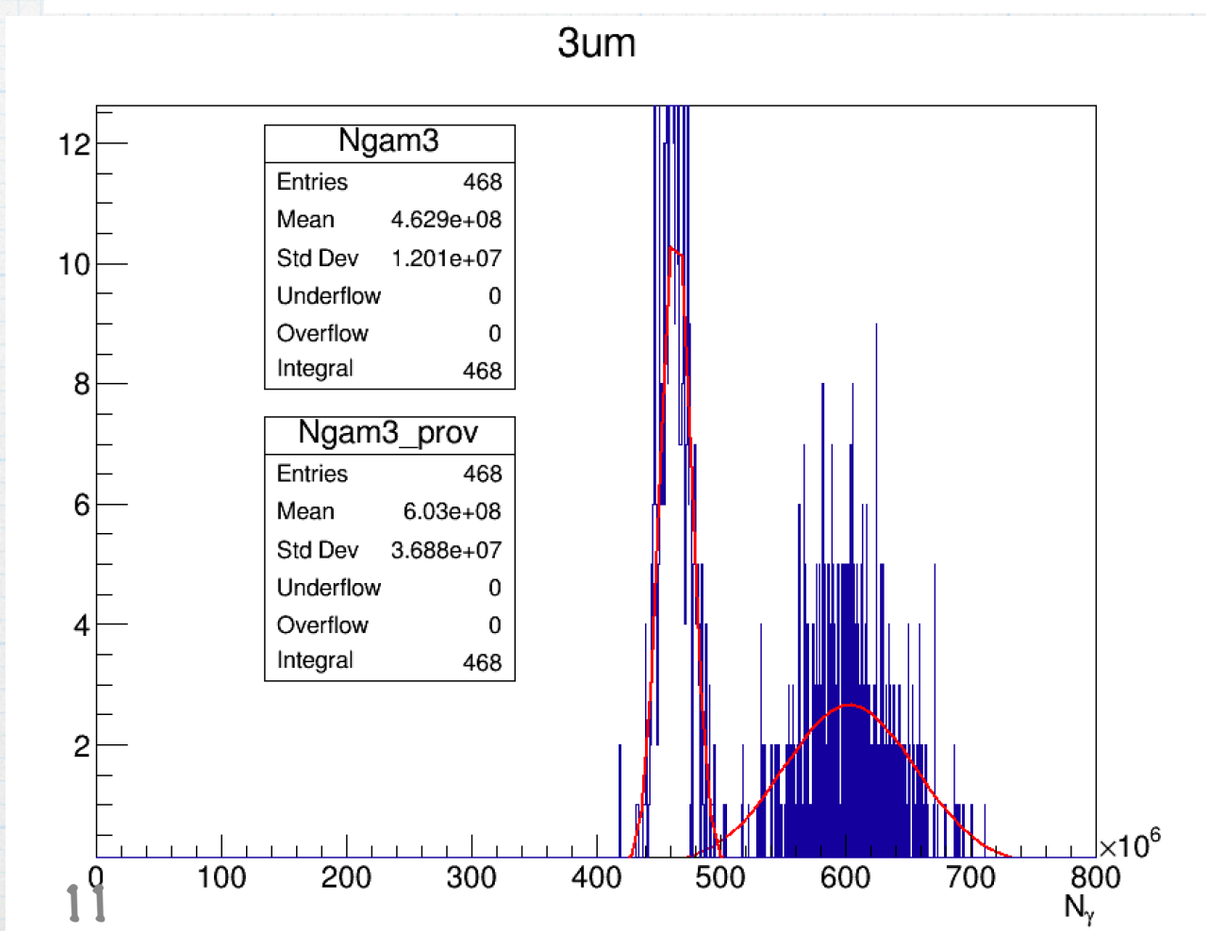


With cut on true Ngamma>1 GeV



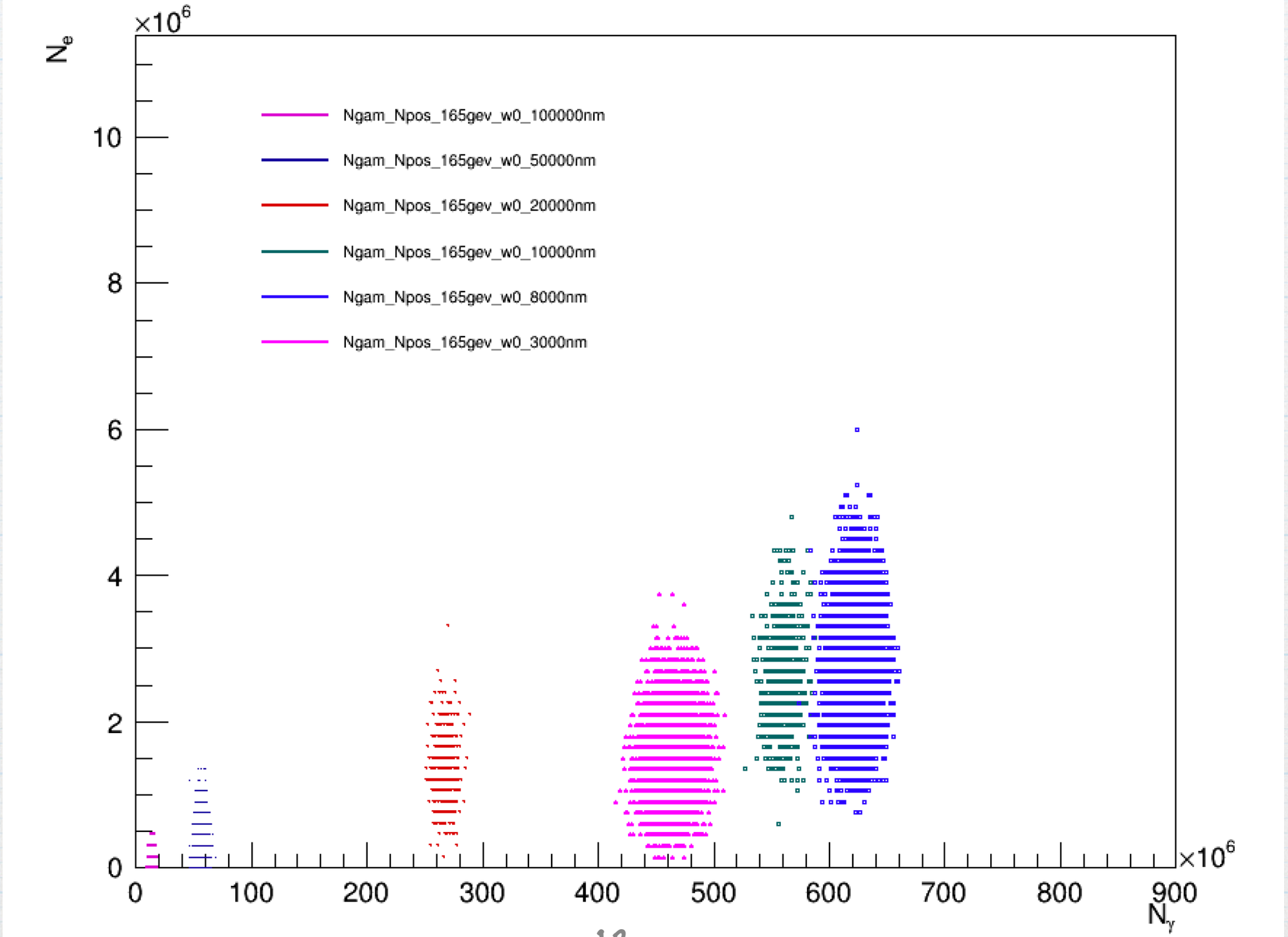
Previous vs "provisional" JETI40, e-laser, 16.5GeV, w0=3 µm

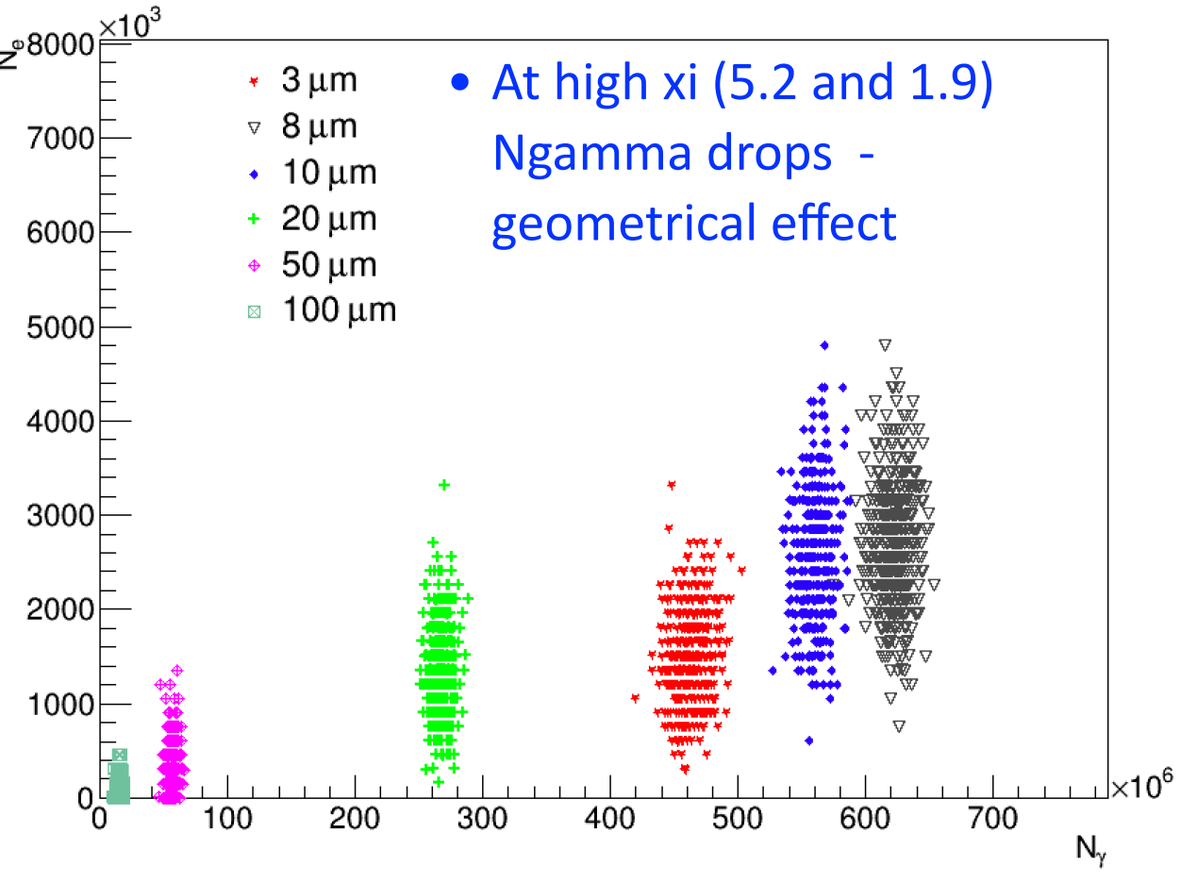




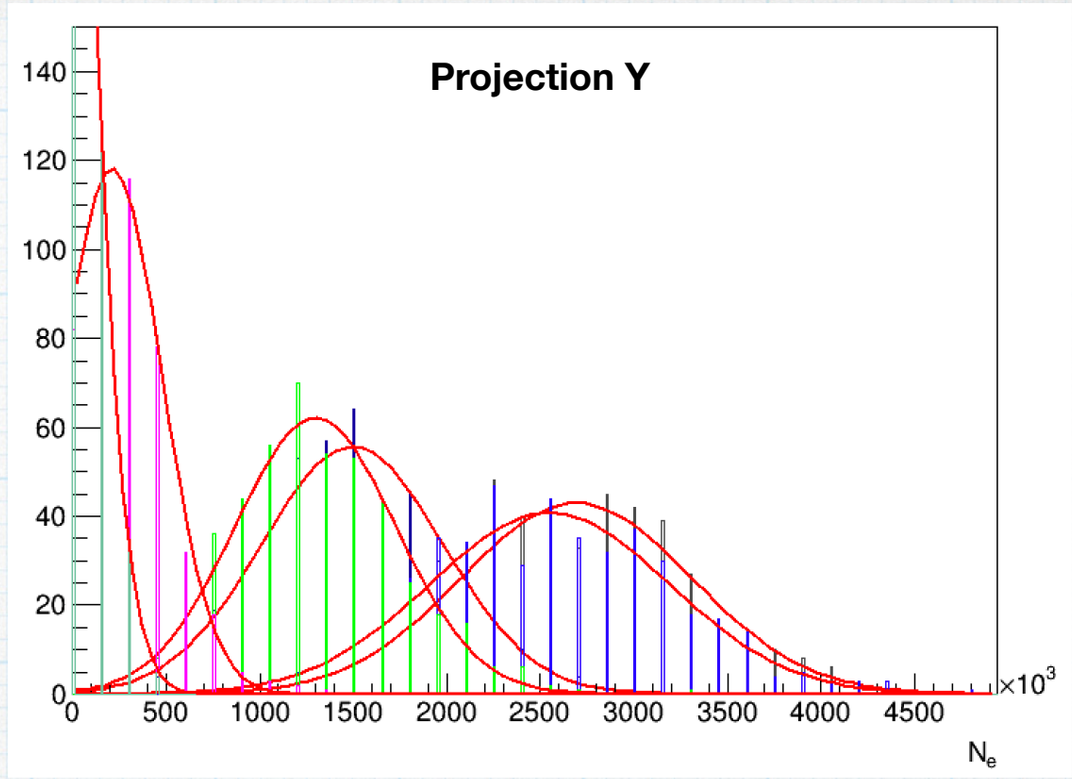
number of pairs vs number of photons per BX for different xi in Lanex scrteens (setup w/o beam pipe)

JETI40, 16.5 GeV, 50 um

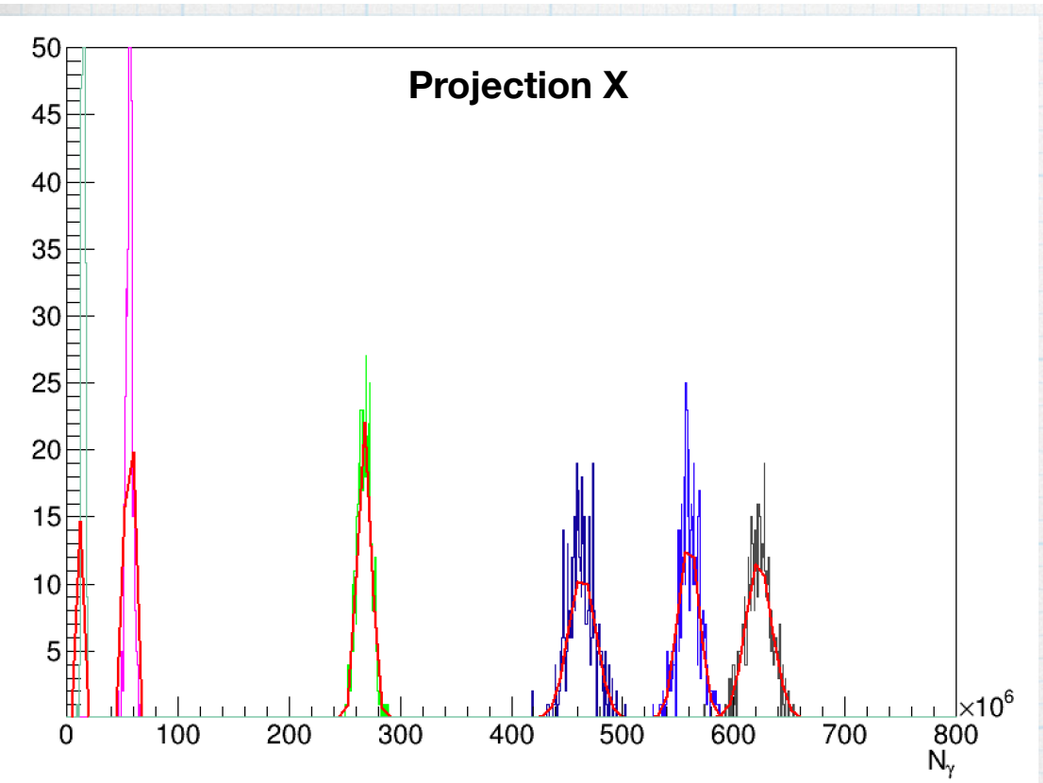




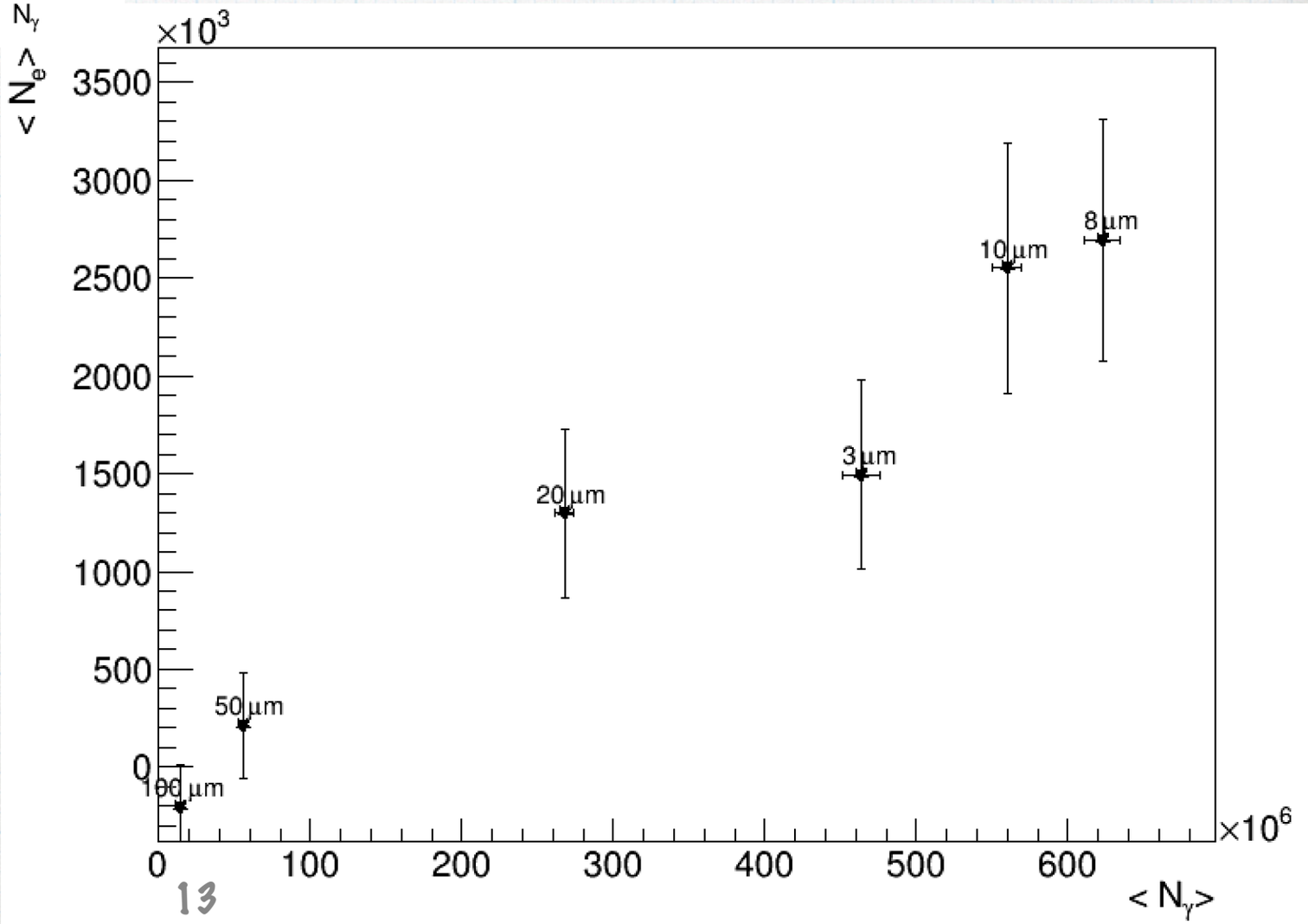
- At high xi (5.2 and 1.9) Ngamma drops - geometrical effect



460 BX



- Spread in number of electrons is substantial ~ 25-30%



	<Ngam>	<Ngam> provisional
3µm	4.64e+08	5.91e+08
8µm	6.23e+08	6.40e+08