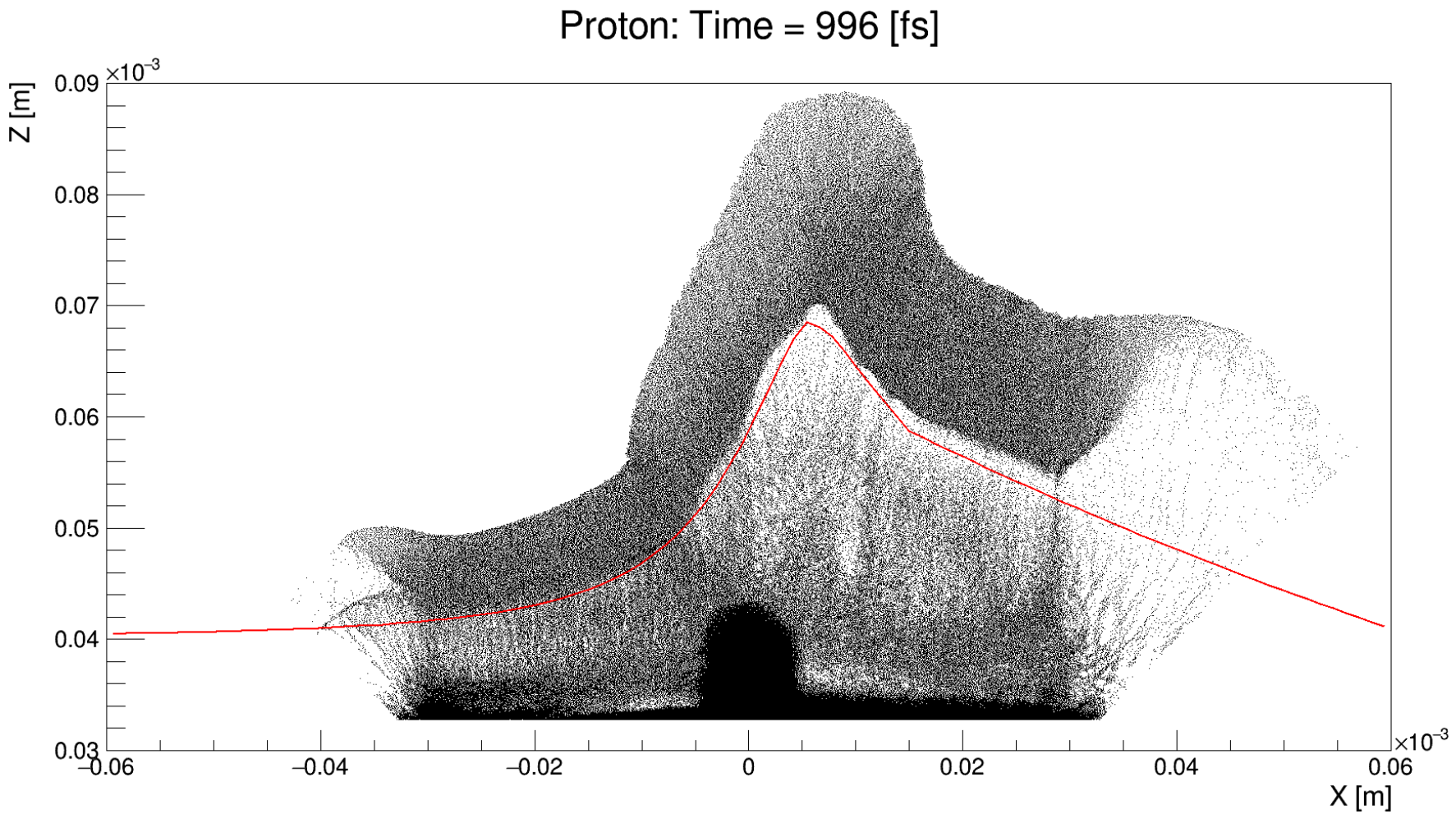
LhARA Meeting

Hin Tung Lau

August 6, 2020

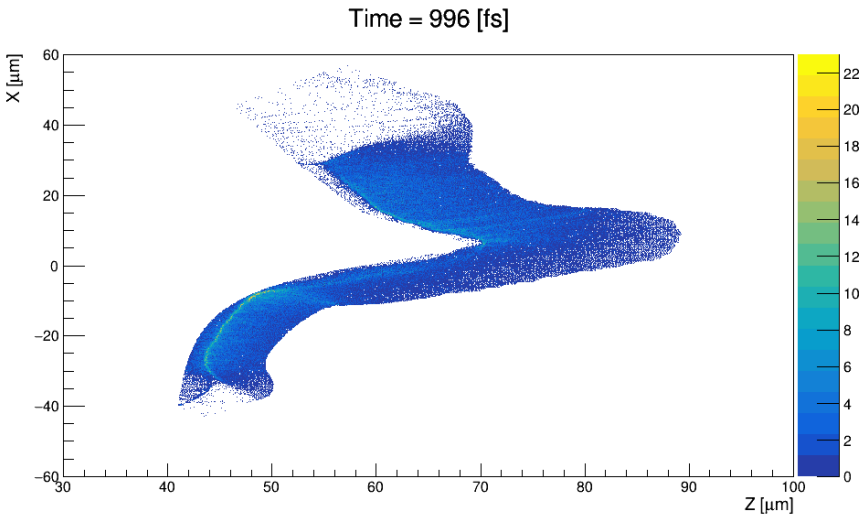
Contour Cut

Defined a function to roughly describe contour

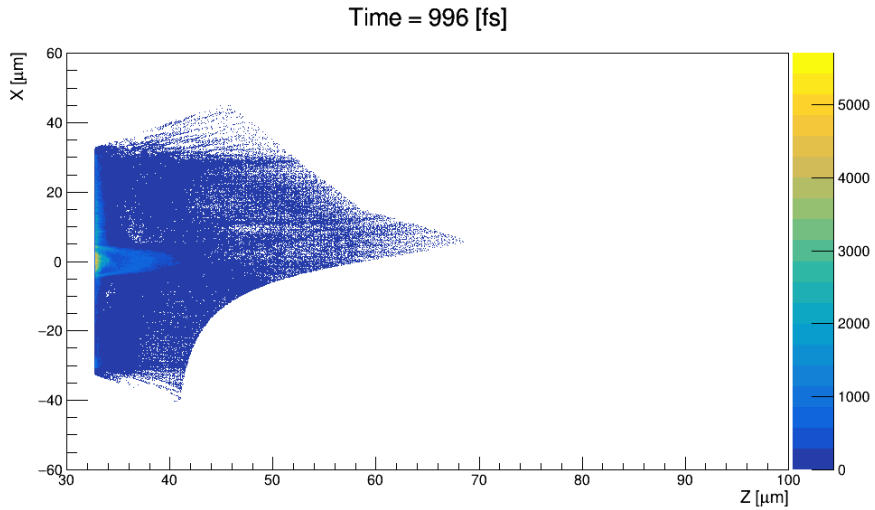


Contour Cut

Surviving:

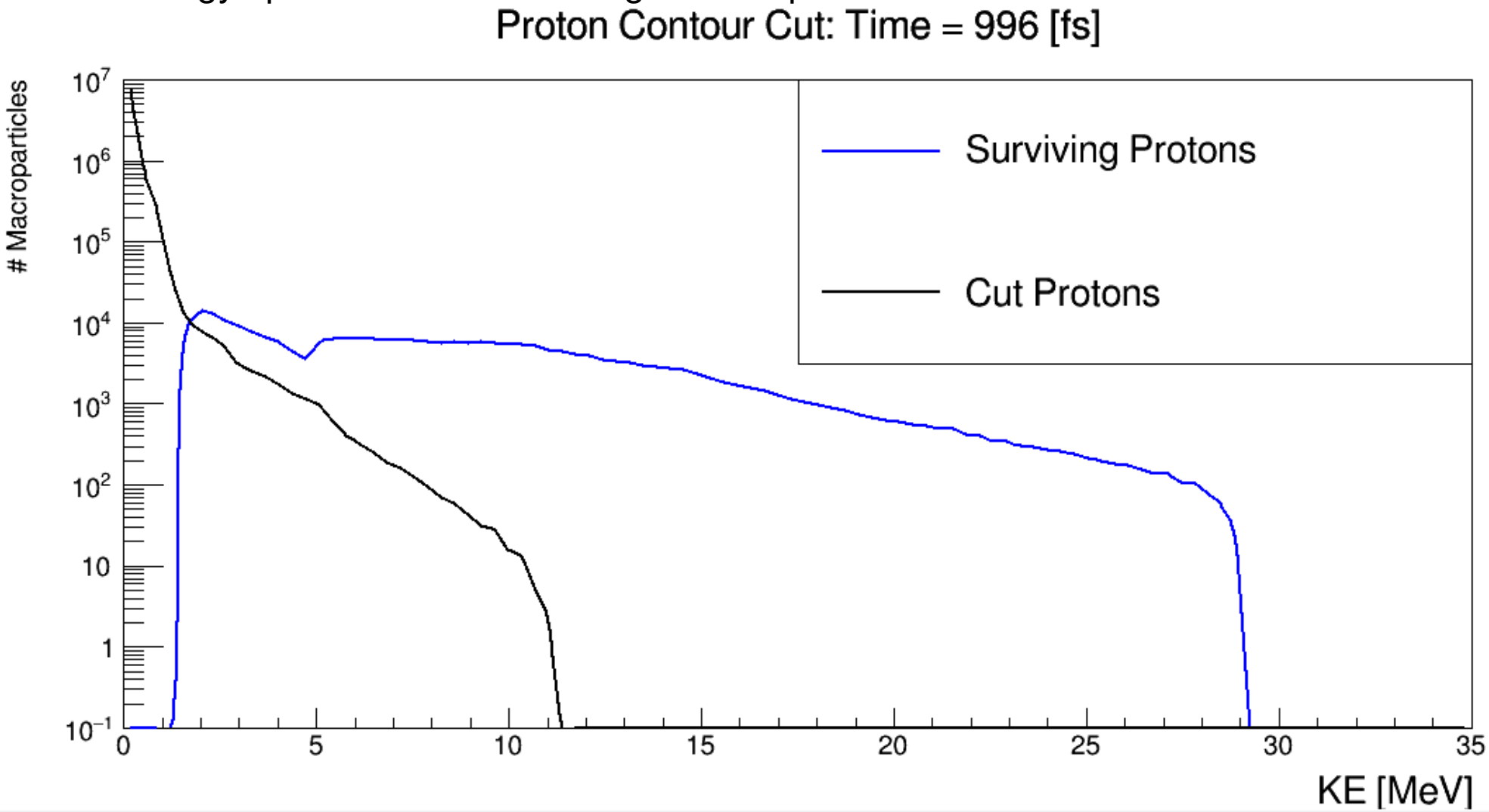


Cut:



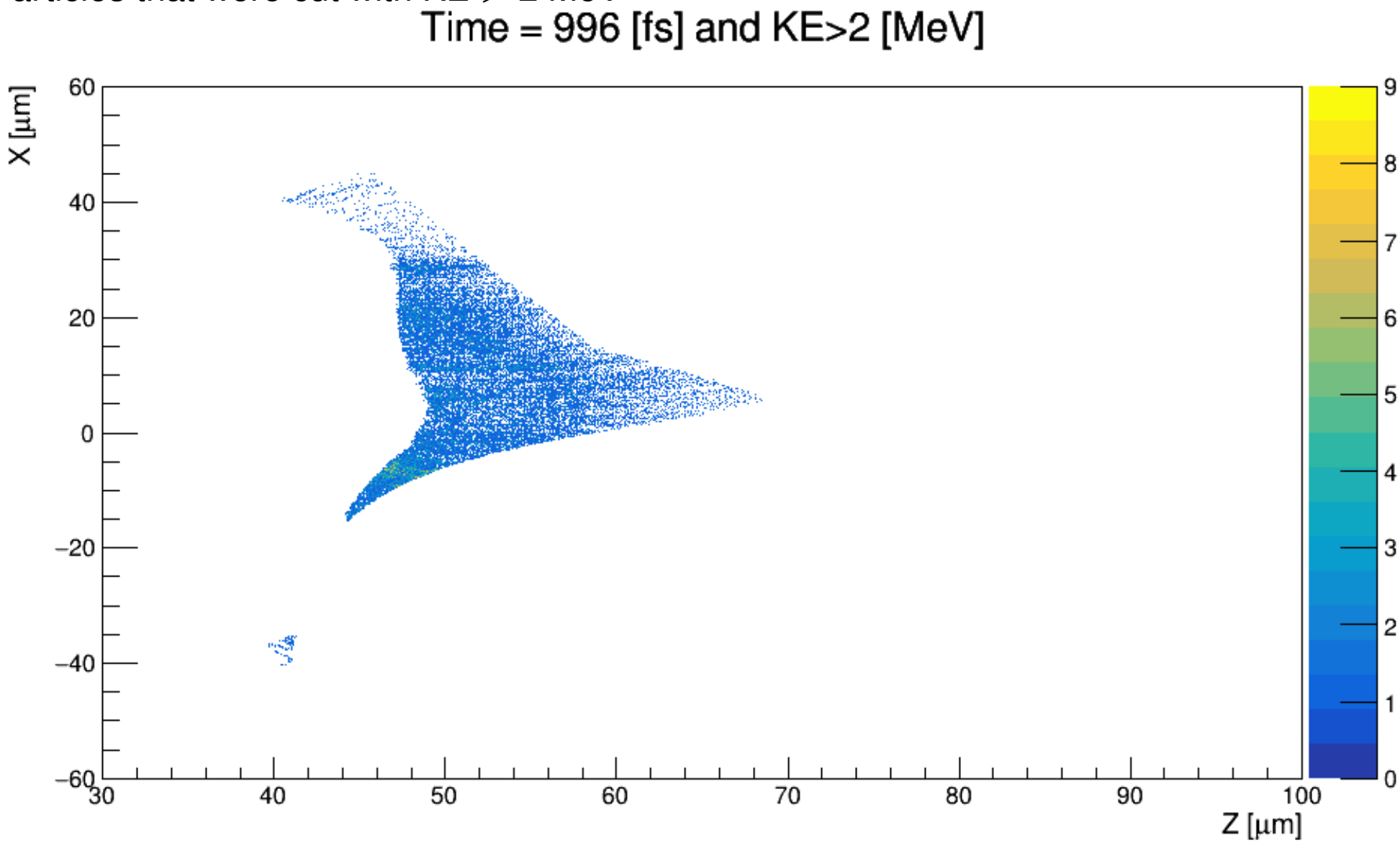
Contour Cut

Kinetic energy spread of both surviving and cut particles:



Contour Cut

Particles that were cut with KE $>$ 2 MeV



Cutoff Energy Discrepancy

Draco 150 TW laser experiment at Dresden, spot size of 3 μm, energy = 3 J, intensities $>$ 10^{21} W/cm^2.

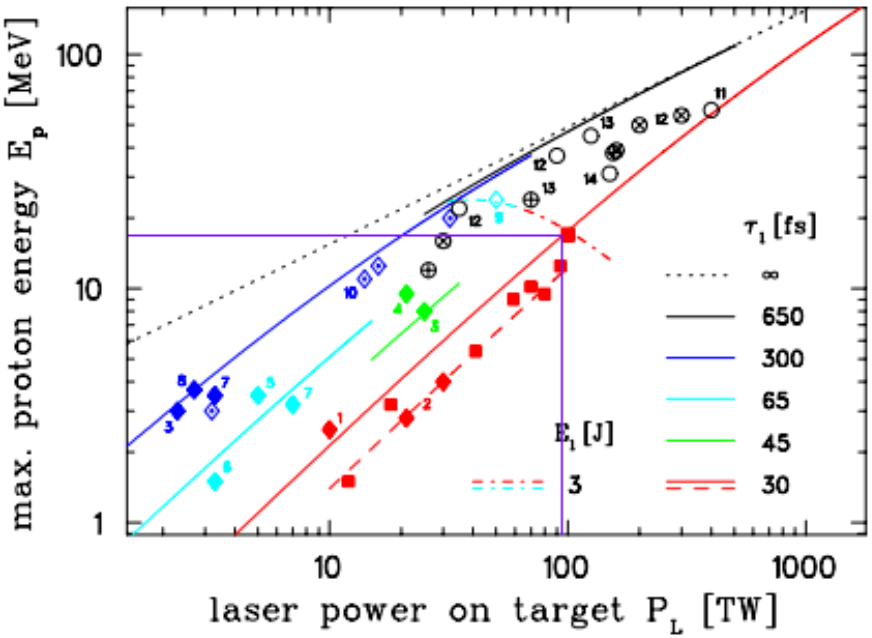


Figure: Thin metail foil irradiated with p-polarized light at incident angle of 45°. Solid red line for 30 fs pulse, for 2 micron foil. Dashed red line is for 5 micron foil. https://iopscience.iop.org/article/10.1088/1367-2630/12/4/045015/pdf

Model from Passoni et al.

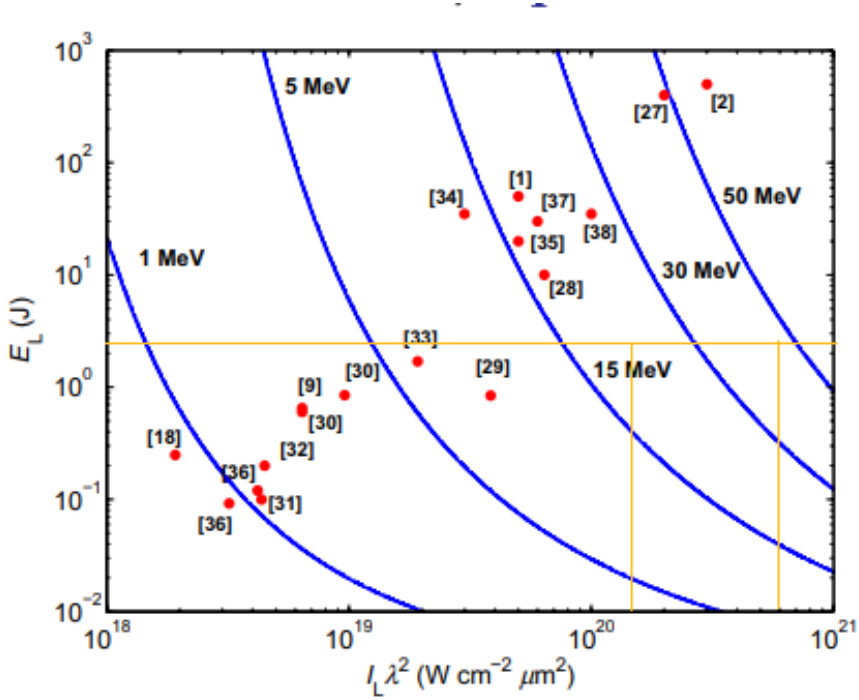


Figure: https://iopscience.iop.org/article/10.1088/1367-2630/12/4/045012/pdf

Cutoff Energy Discrepancy

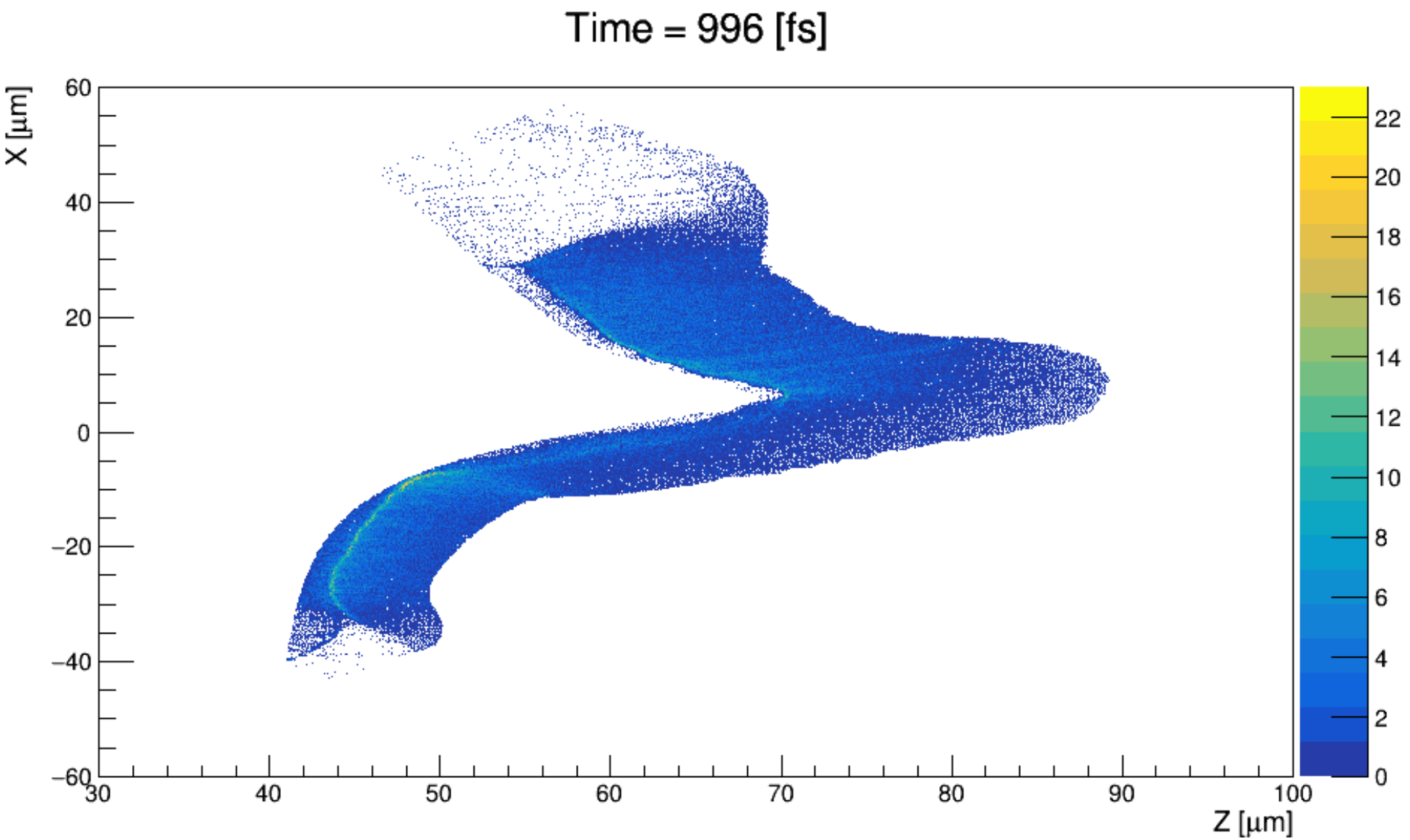
Assuming laser energy = 2.5 J and focal width FWHM = 3 μm:

Parameter	**Value**
Laser Power	93.90 [TW]
Intensity	9.18×10^{20} [W/cm]^2
a_0	20.75

Assuming laser energy = 2.5 J and focal width FWHM = 6 μm:

Parameter	**Value**
Laser Power	93.90 [TW]
Intensity	2.30×10^{20} [W/cm]^2
a_0	10.37

Backup


Time = 996 [fs]
X [µm]
60
40
20
0
−20
−40
−60
30
40
50
60
70
80
90
100
Z [µm]
22
20
18
16
14
12
10
8
6
4
2
0

Backup

For Gaussian pulse:

1. $$\text{Laser Power [W]} = 0.94 \frac{\text{Laser Energy [J]}}{\text{Pulse Duration [s]}}$$

2. $$\text{Peak Intensity } \left[\text{W/cm}^2\right] \simeq 0.88 \frac{\text{Laser Power [W]}}{(\text{Focal FWHM [cm]})^2}$$

3. $$a_0 = \left(0.856 \times 10^{-9}\right) \sqrt{\text{Peak Intensity [W/cm}^2\text{]} \times (\text{Wavelength } [\mu m])^2}$$