



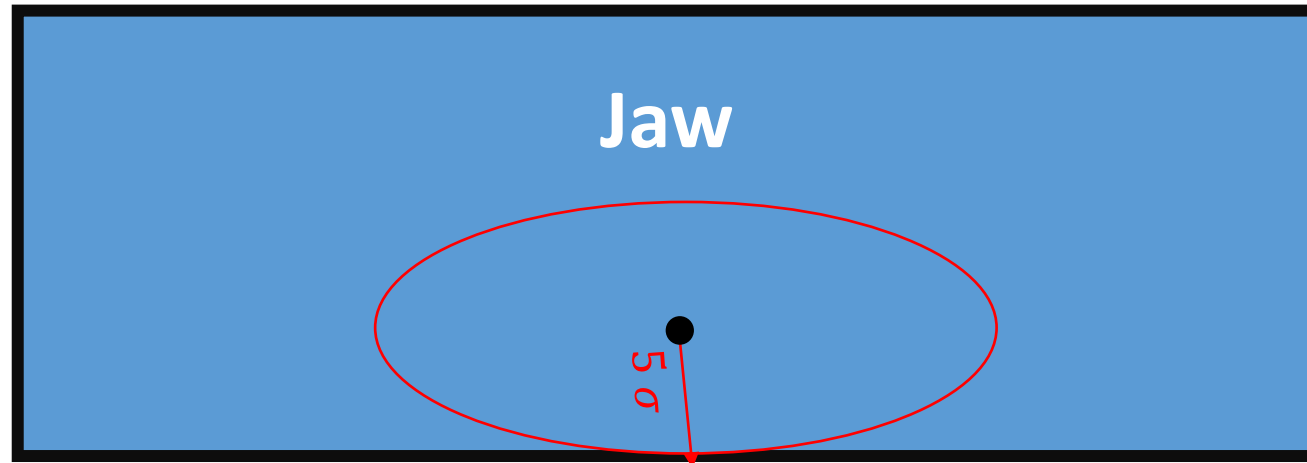
# Material effects on maximum beam loss on collimators

Stefano Marin, Anton Lechner for SY-STI

# Deep impact on collimator

$$\beta_x = 510 \text{ m}$$
$$\beta_y = 720 \text{ m}$$

$$\sigma_x = 600 \mu\text{m}$$
$$\sigma_y = 37 \mu\text{m}$$

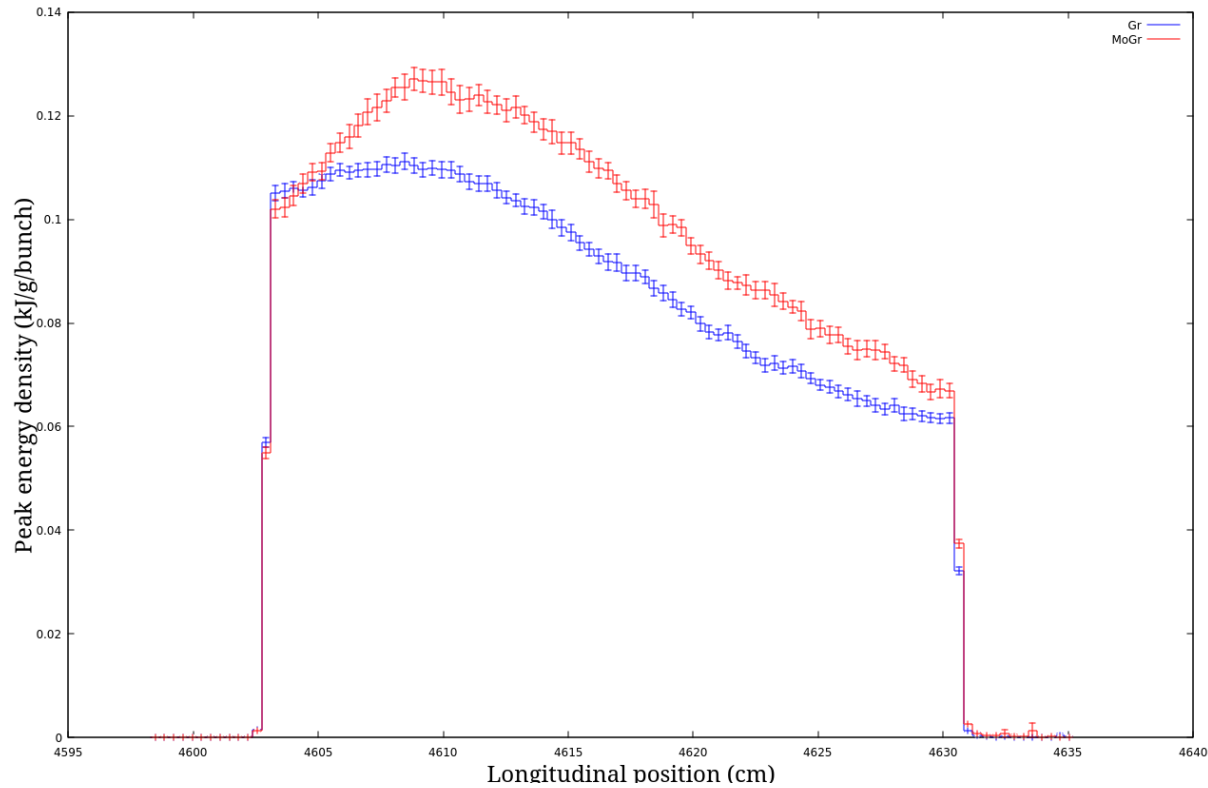


**Bunch intensity:  $2.16 \times 10^{11}$**

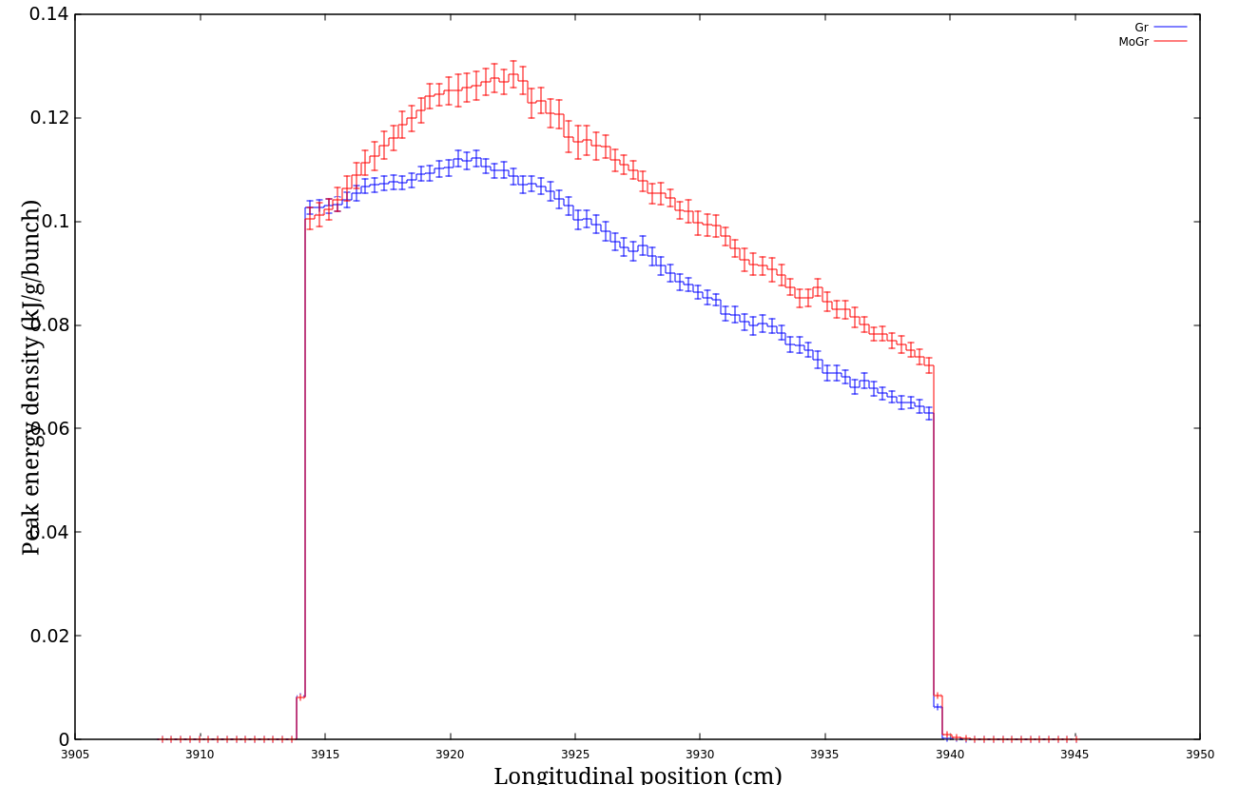
**All results in kJ/g/bunch**

# Energy absorbed per bunch

Material comparison TCP.H.B1



Material comparison TCP.V.B1



Approximately  $0.11 \frac{\text{kJ}}{\text{g bunch}}$  for graphite and  $0.13 \frac{\text{kJ}}{\text{g bunch}}$  for MoGr

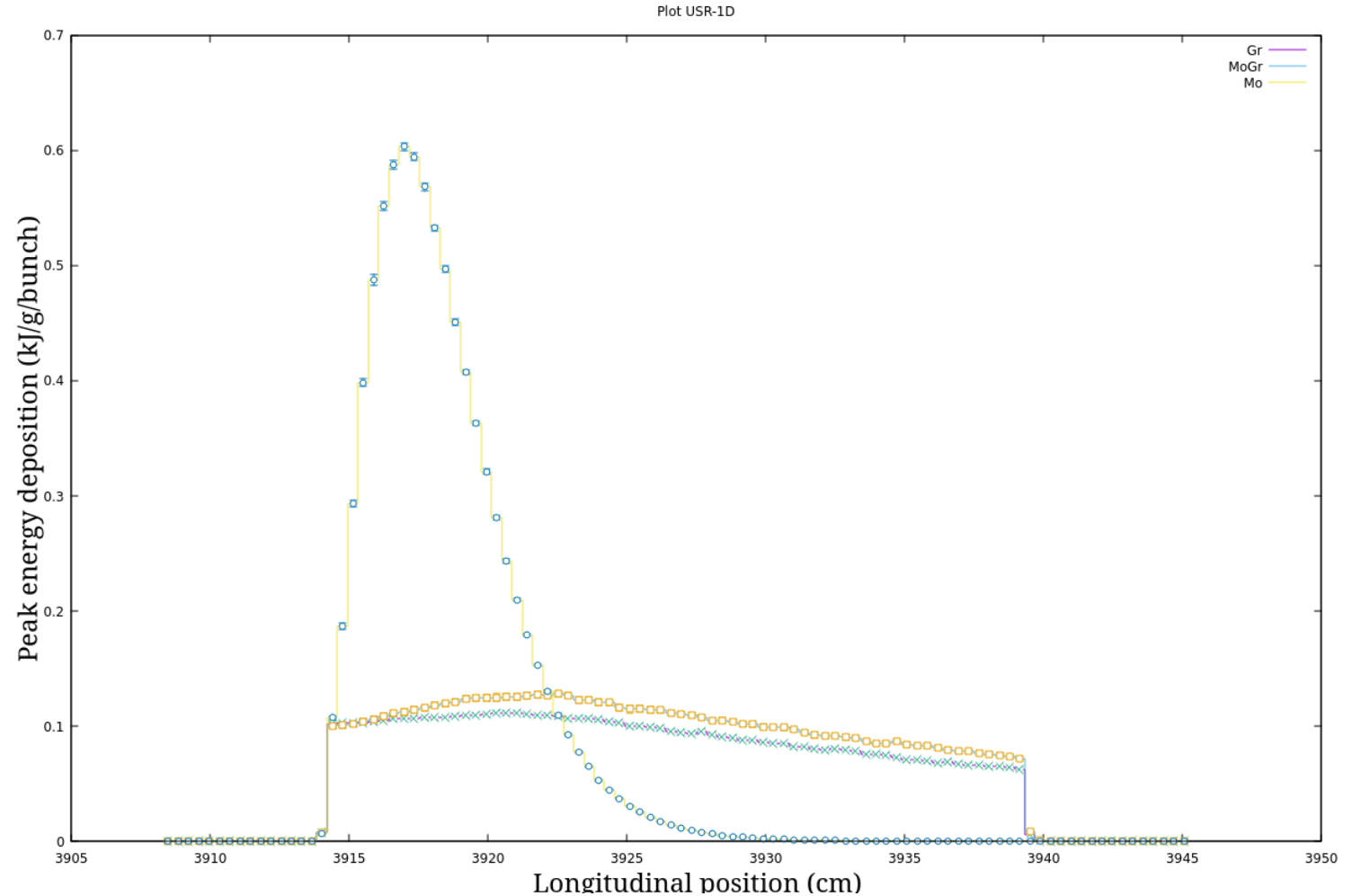
# Bunches limit

Considering a maximum absorption limit of 5 kJ/g in graphite, we can expect up to ~45 bunches.

Considering the lower limit on MoGr and its higher absorption, we can expect fewer than <40 bunches.

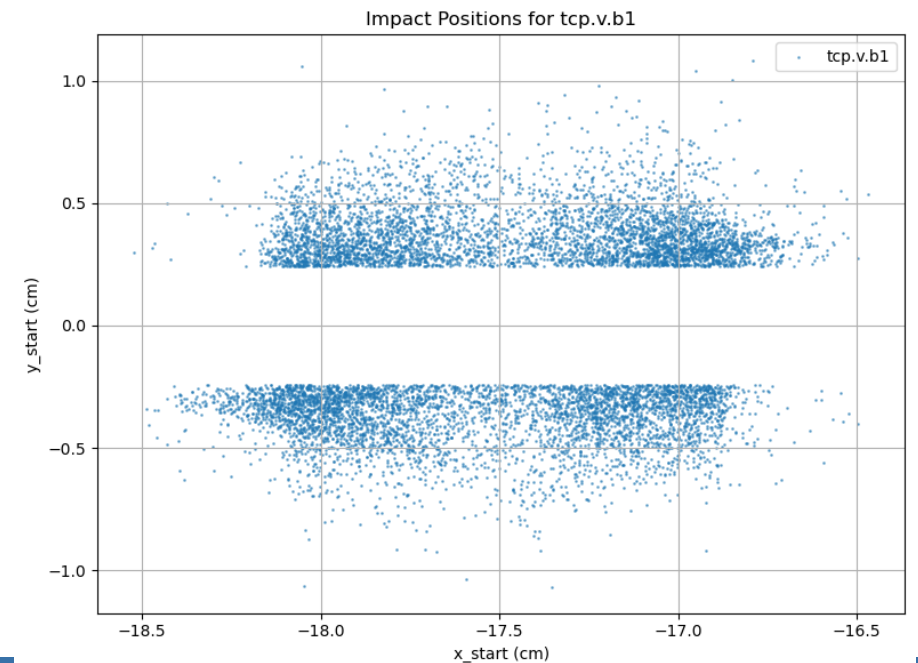
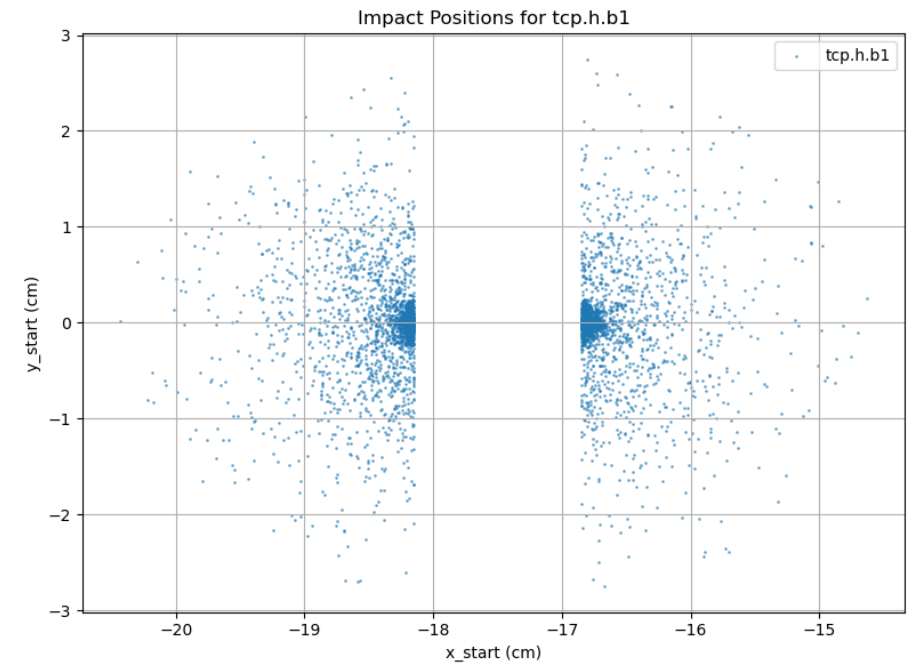
# Molybdenum TCP

We also tested pure Mo for the primary collimators, which has a significantly higher power deposition:



# Effects of realistic impact

- After importing and running the simulation with the new source, we find that the results presented so far remain valid
  - With 2 shower absorbers, the dose absorbed by environment and tunnel is ~6 kW (single positron beam)
  - Similar to the case of pencil beam with 1 um impact parameter centrally hitting the TCP jaws



# Next steps

- 3D tunnel modeling for beam crossing and momentum collimation