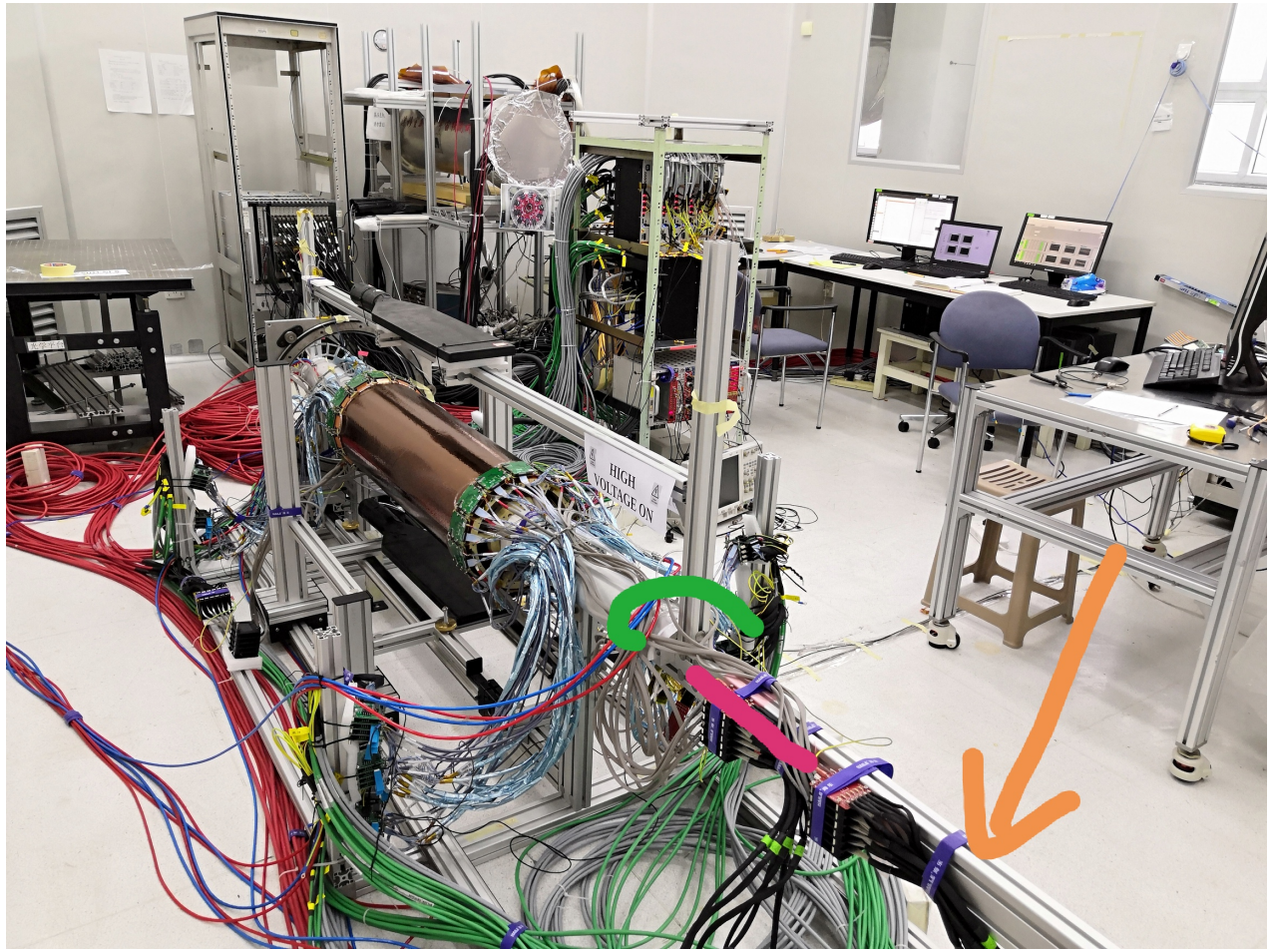
Support Structure of the current CGEM setup

Stefano Spataro
(after several discussions with mechanics group, Lia and Isabella)
16/03/2020



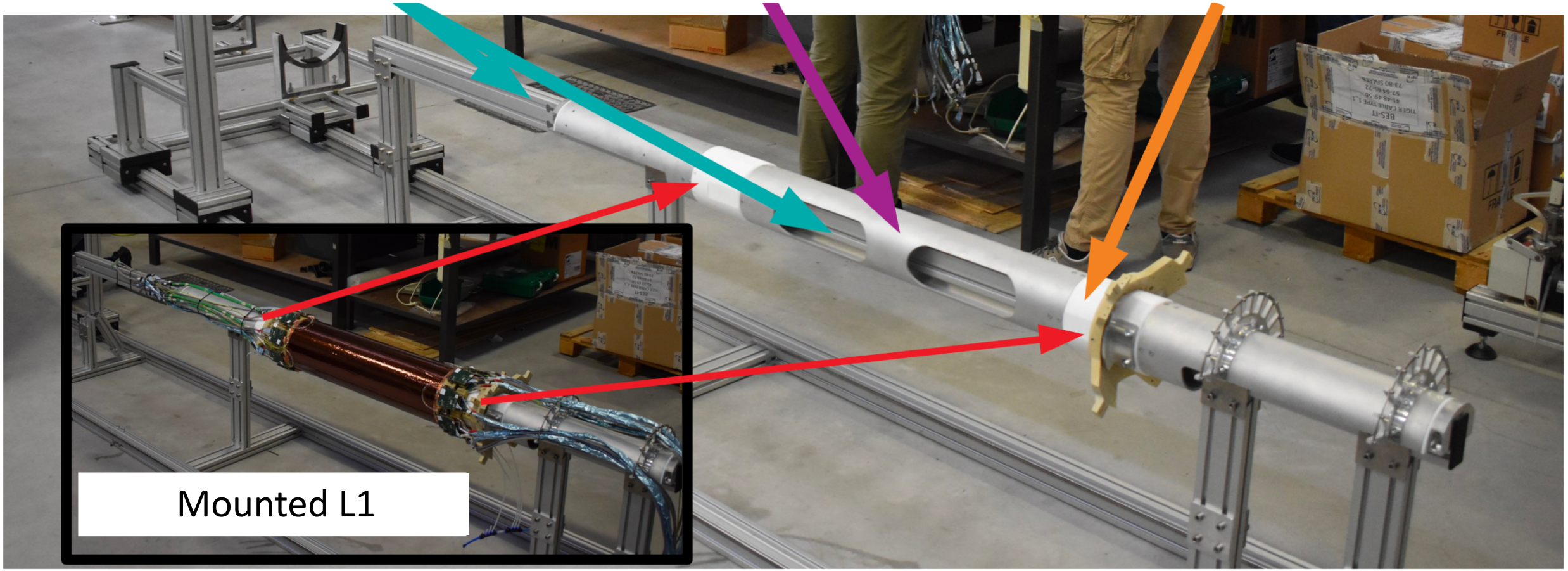
Pics by Ilaria

The geometry of the support structure

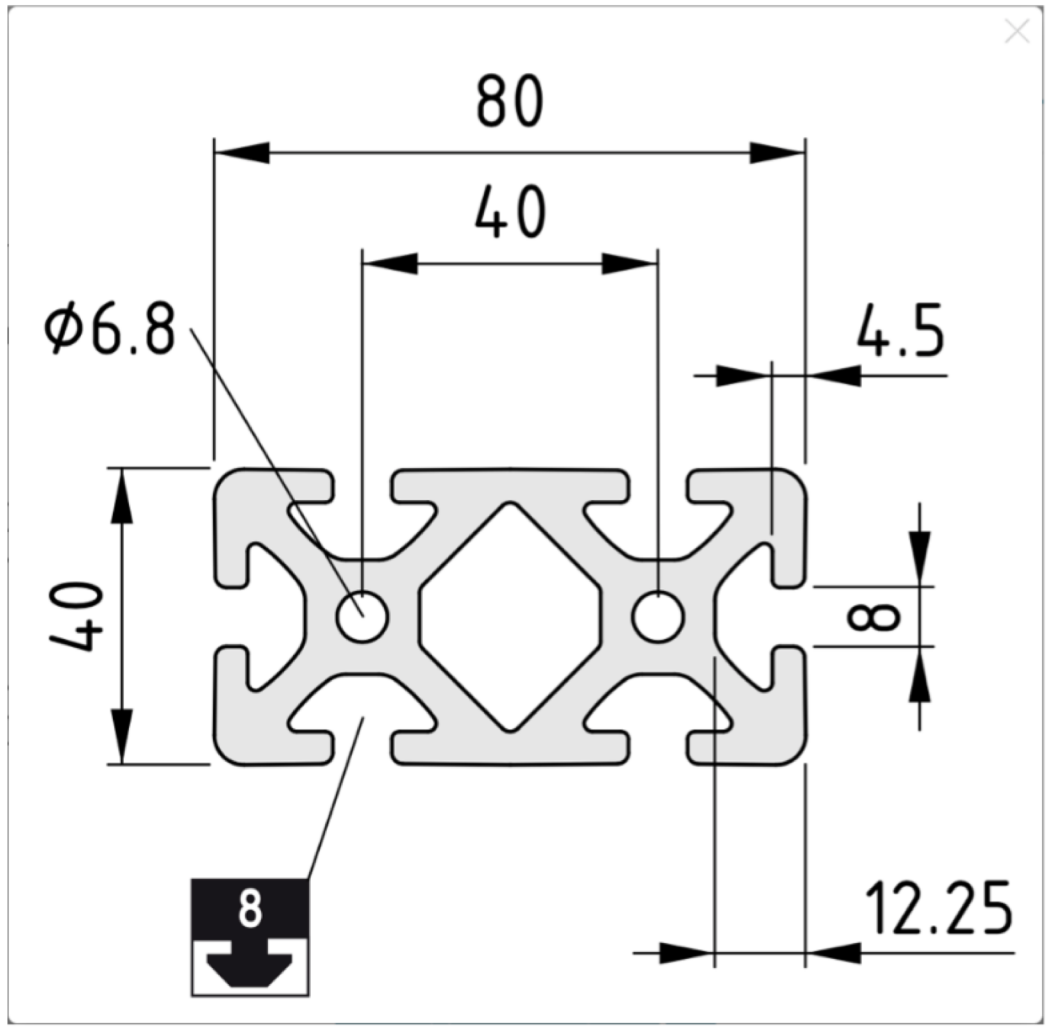
ITEM aluminum profile

aluminum cilinder

round

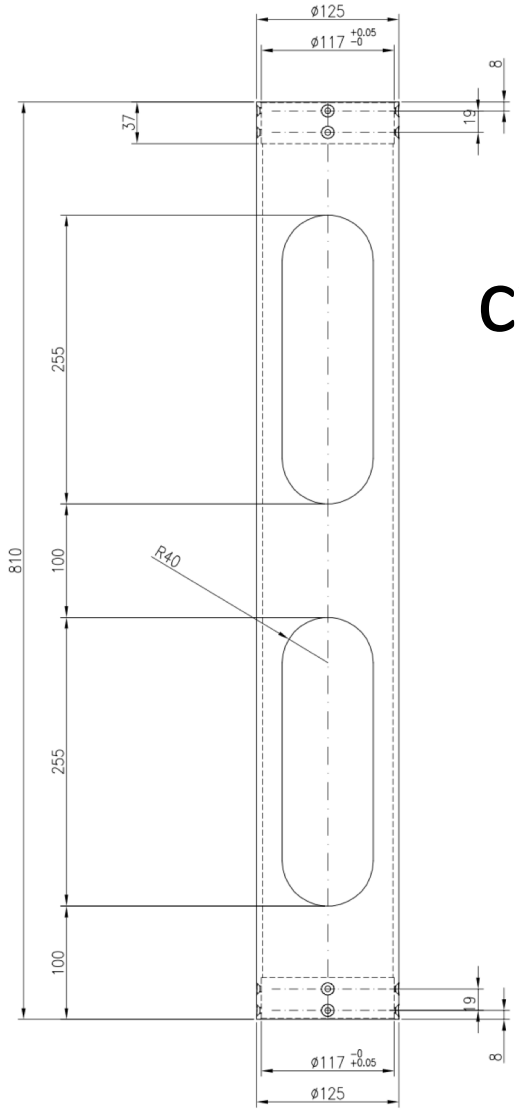


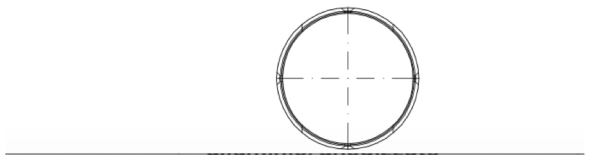
profile

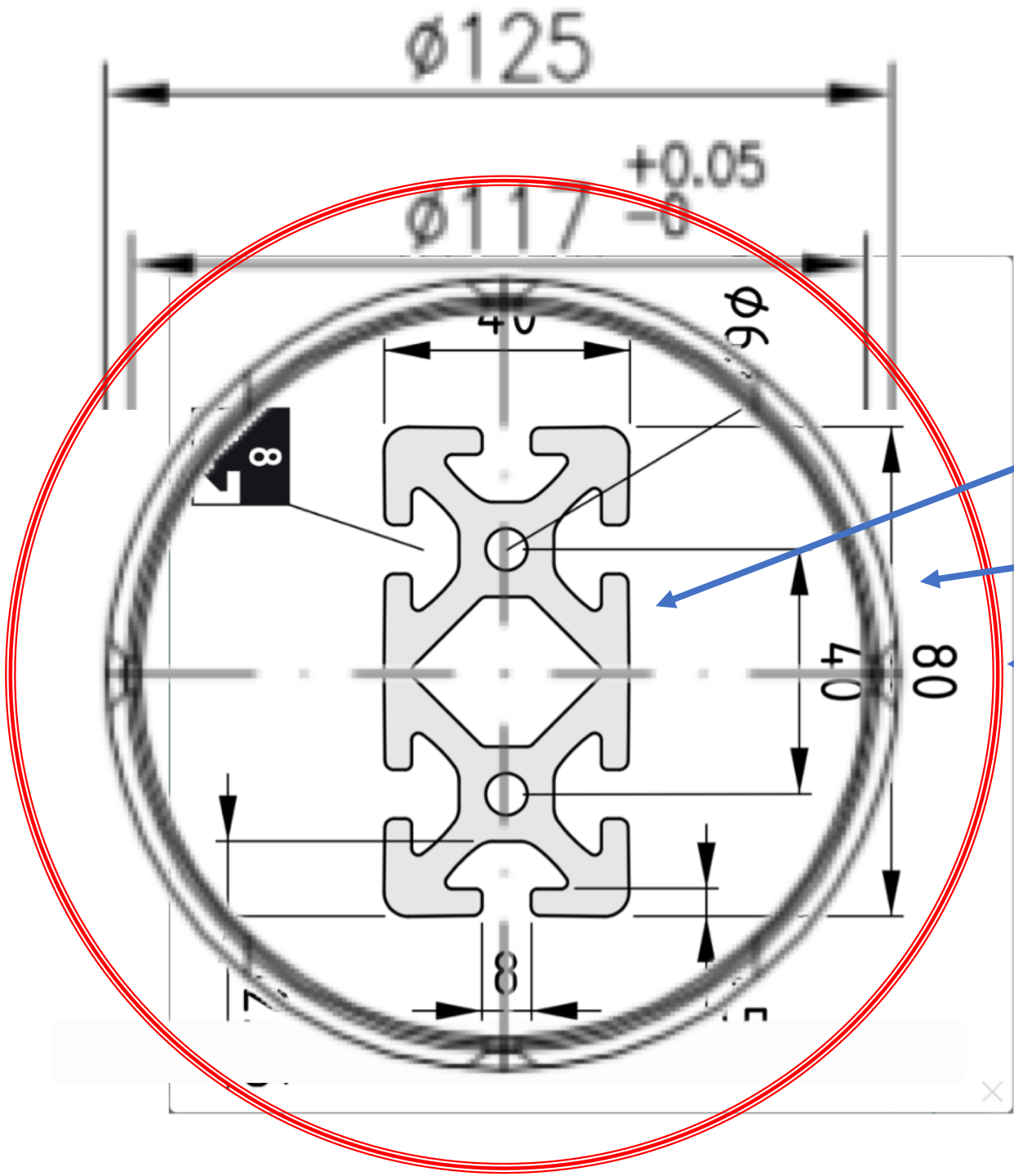


mm

cylinder





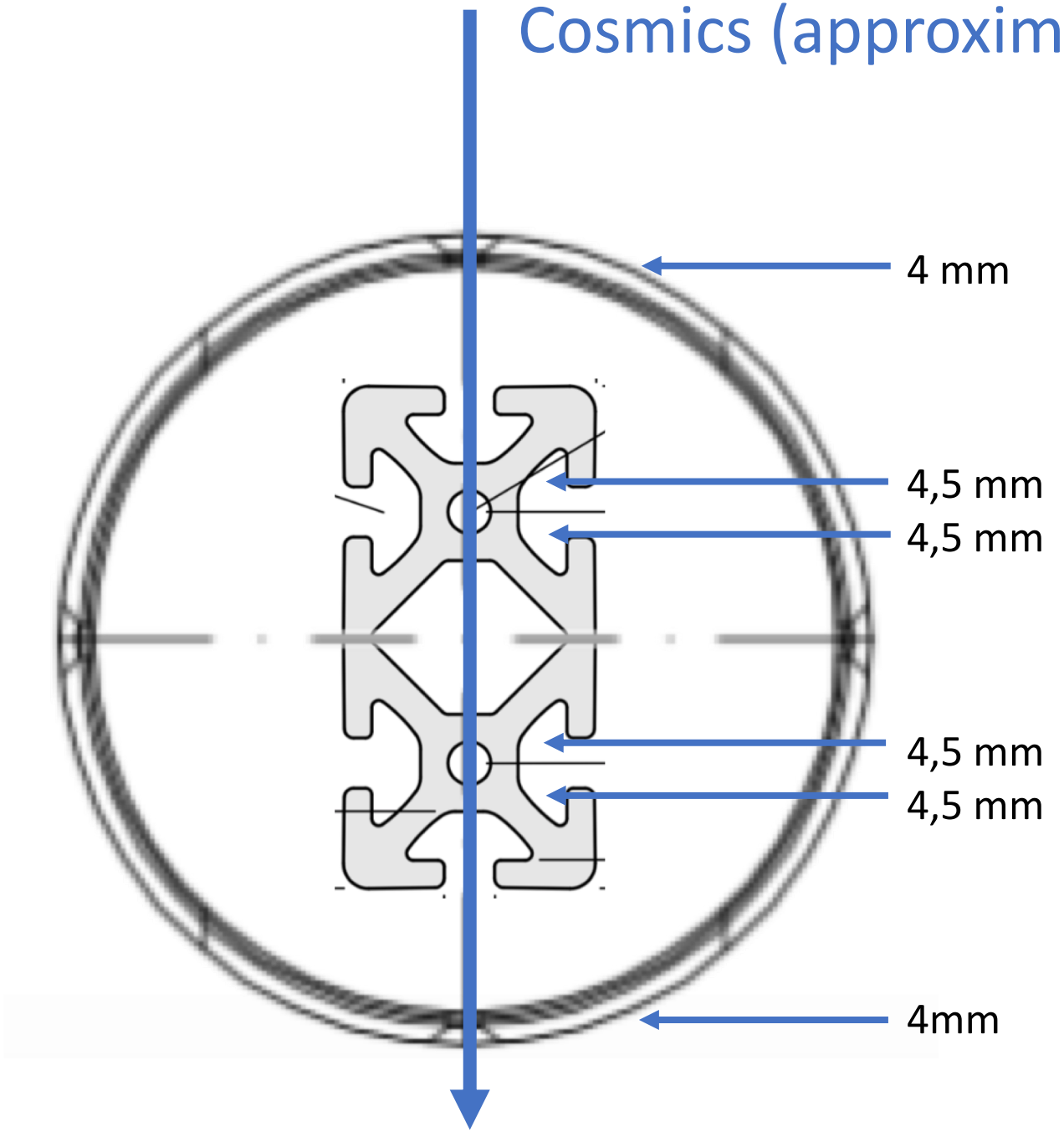


profile

cylinder

L1

Cosmics (approximated)



Just to have an approximative thickness:

Cylinder:	8 mm
Profile:	18 mm
Cylinder+profile:	26 mm

Multiple Scattering

$$\vartheta_0 = z \frac{13.6 MeV}{PV} \sqrt{\frac{L}{X_0}}$$

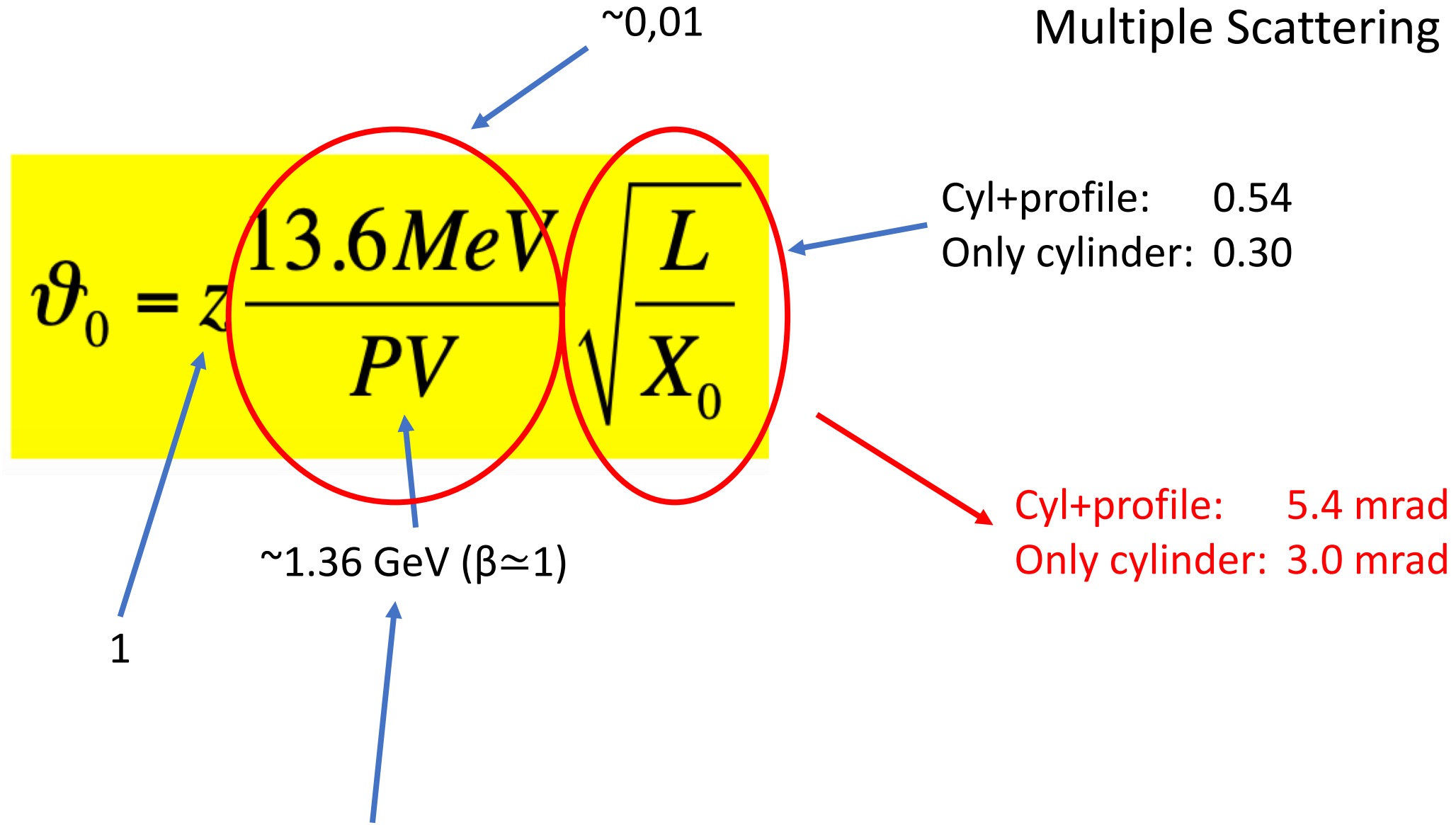
Cyl+profile: 26 mm
Only cylinder: 8 mm

Aluminium
Radiation length 8.897 cm

1

? GeV (β?)

Multiple Scattering



Just an approximation to have round numbers, you can play with different values

Multiple Scattering

~0,01

$$\vartheta_0 = z \frac{13.6 MeV}{PV} \sqrt{\frac{L}{X_0}}$$

Cyl+profile: 0.54
Only cylinder: 0.30

~1.36 GeV (β≃1)

1

Cyl+profile: 5.4 mrad
Only cylinder: 3.0 mrad

↓

Extrapolation to 8 cm

L1 radius, such as Al only at centet

↓

Cyl+profile: 430 um
Only cylinder: 240 um

Just an approximation to have round numbers,
you can play with different values

Conclusions

Just an infinite series of approximation to have a first educated guess on the material effects.

It is evident that the internal structure can induce a modification of cosmics trajectories, of the order of hundred of microns.

This is a structure only for support not originally meant to be kept for the cosmics studies, but not possible to remove it in the short/mid term, for obvious reasons

Ongoing studies with GEANT to understand better the effects, also in the secondary production