LhARA: Meeting

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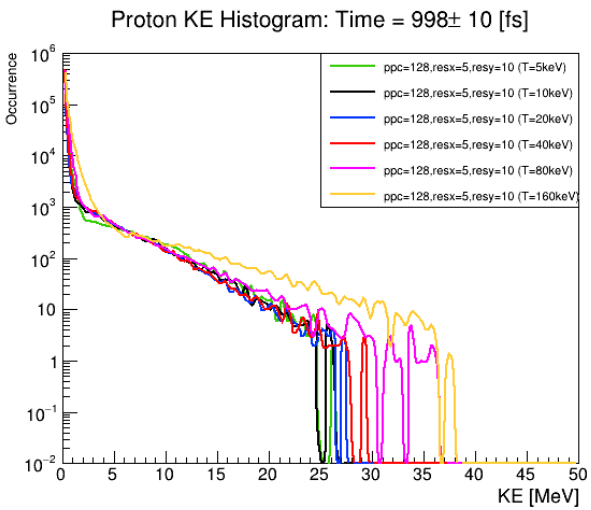
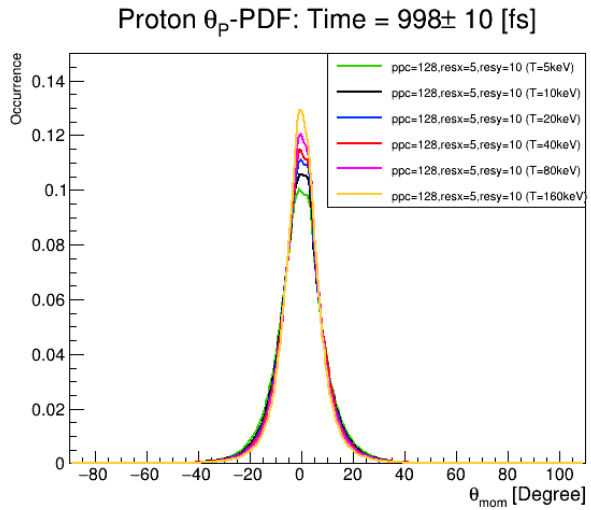
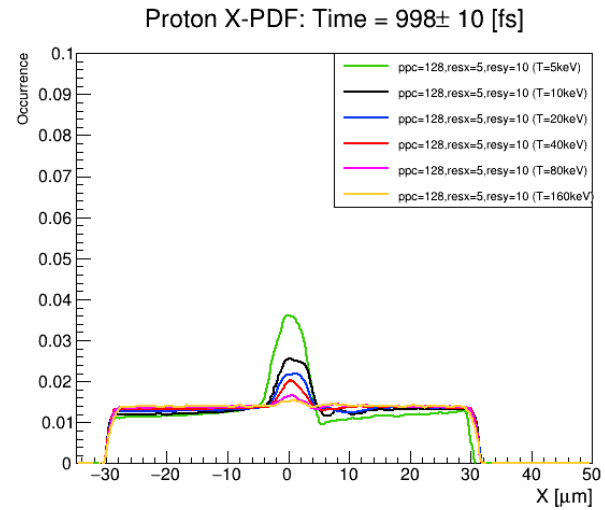
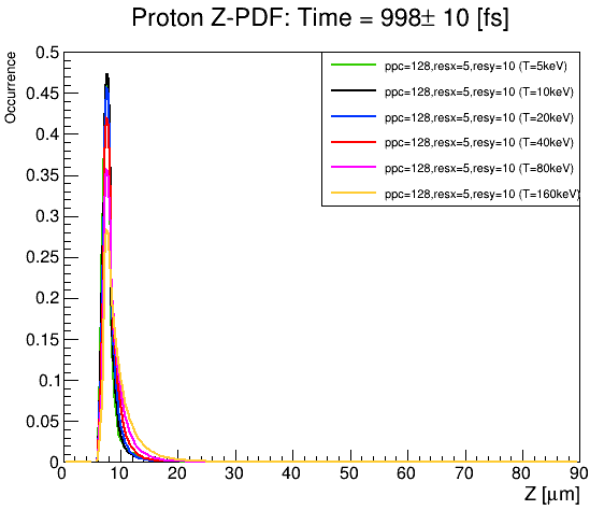
October 29, 2020

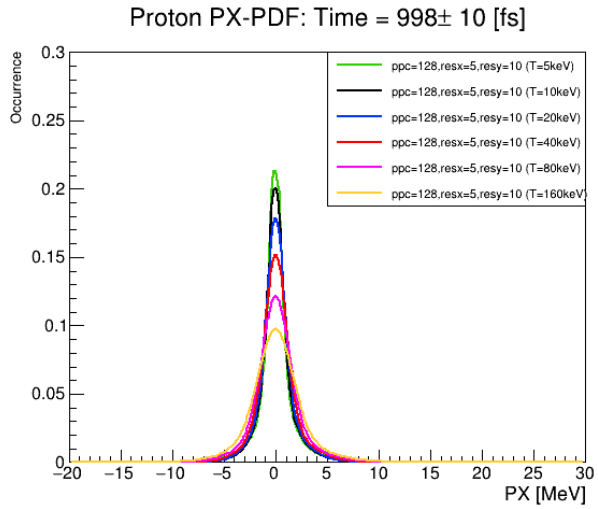
Varying Initial Temperature of Foil

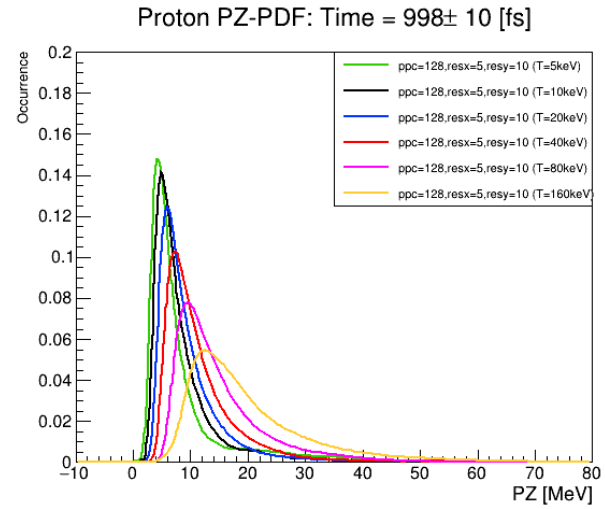








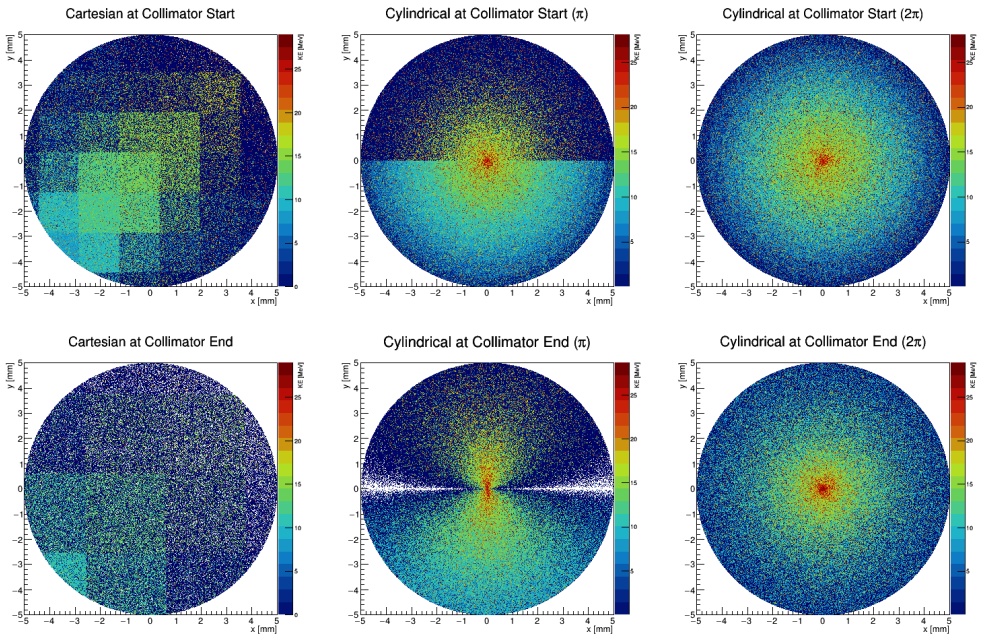




Increasing temperature increases KE and flattens transverse profile.

Comparison of 3D Smearing

No scaling of momentum.



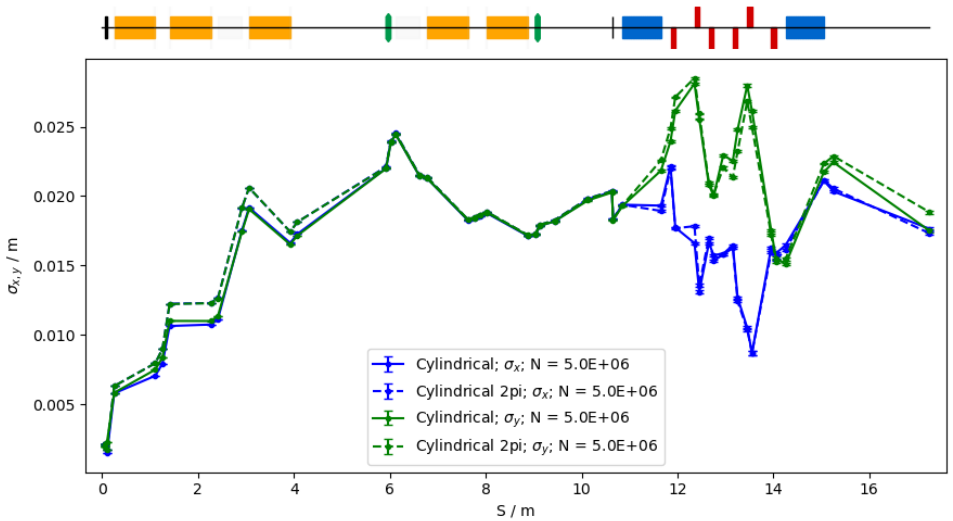


Figure: Dirty beam evolution doesn't appear to differ greatly.

(Beamline missing some collimators. There are reasons for and against each of the three smearing methods.)

Acceptance Values from Jaroslaw

Here you have parameters of the beam line from the original design of LhARA:

- Half total beam size at 10cm from the target: 2.6mm,
- Half total angular spread of the beam at 10cm from the target 4mrad,
- Beam line acceptance 1.64×10^{-6} Pi.m.rad (taken as 4 Gaussians) .

Where is the collimator positioned relative to target?

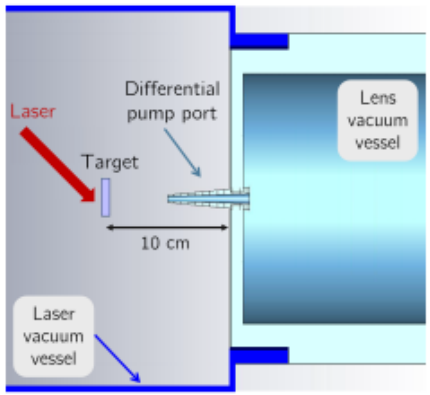


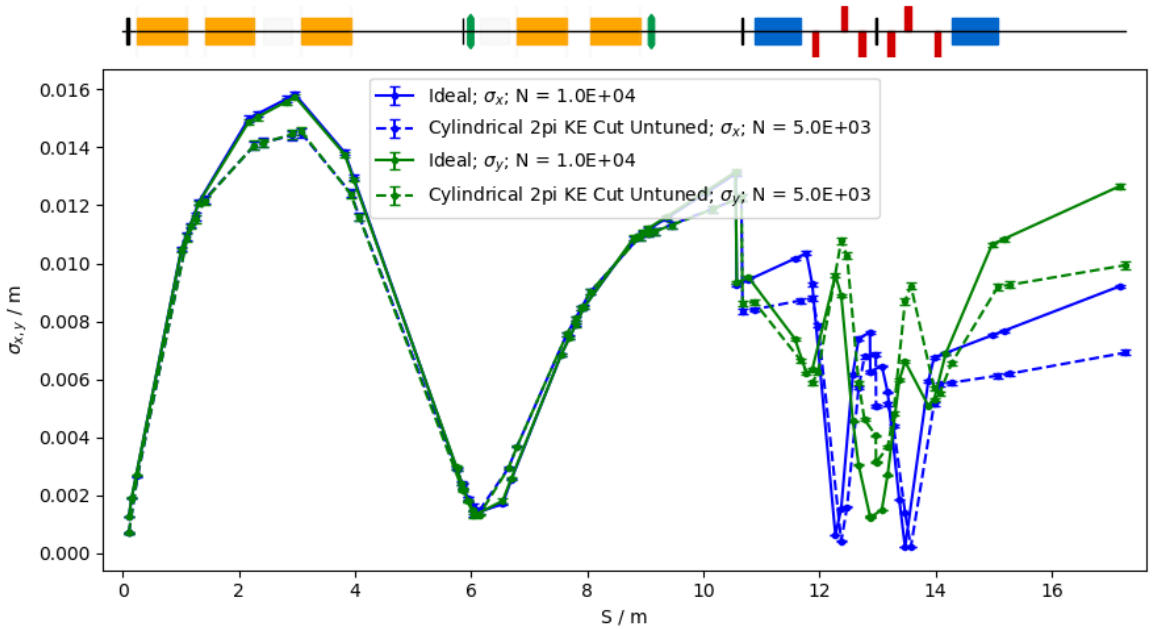
Figure 6: Schematic diagram of the interface between the laser target and the first Gabor lens. The laser vacuum vessel (dark blue) is connected to the lens vacuum vessel (light blue) with two flanges shown. The differential pump port is re-entrant into the laser vacuum volume with 5 cm closest approach to the target.

BDSIM Twiss Optics Fitting

For a Cylindrical 2pi beam, with a 2mm collimator with a KE cut for $14.7 \leq \text{KE} \leq 15.3$ at 10 cm after target (after collimator):

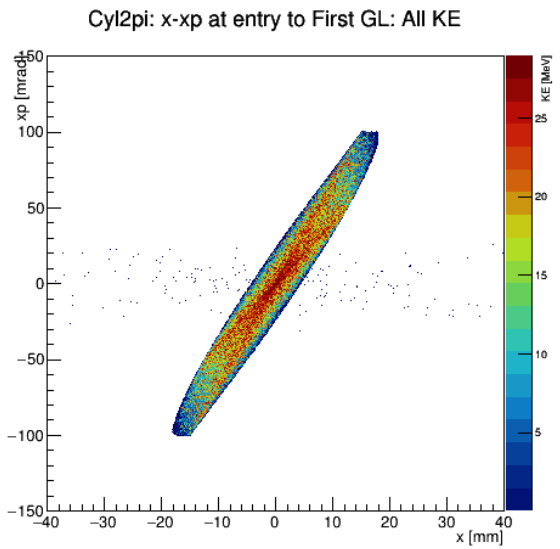
- $\beta_x = 0.0538$ [m]
- $\beta_y = 0.0519$ [m]
- $\alpha_x = -0.540$
- $\alpha_y = -0.514$
- Geometric $\epsilon_x = 9.31 \times 10^{-6}$ [π m mrad]
- Geometric $\epsilon_y = 9.64 \times 10^{-6}$ [π m mrad]

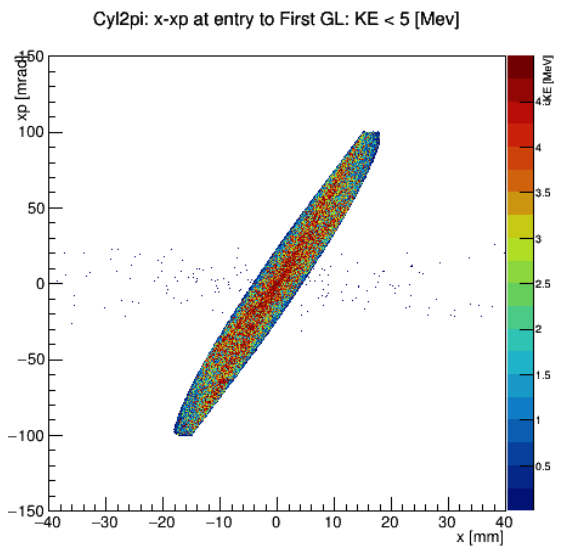
Probably will end up changing...

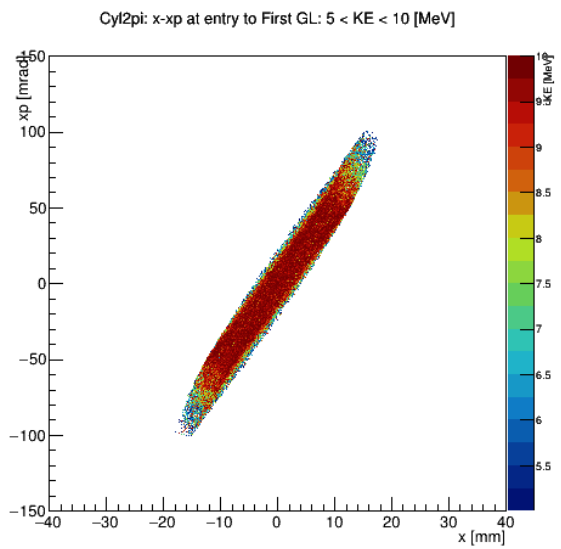


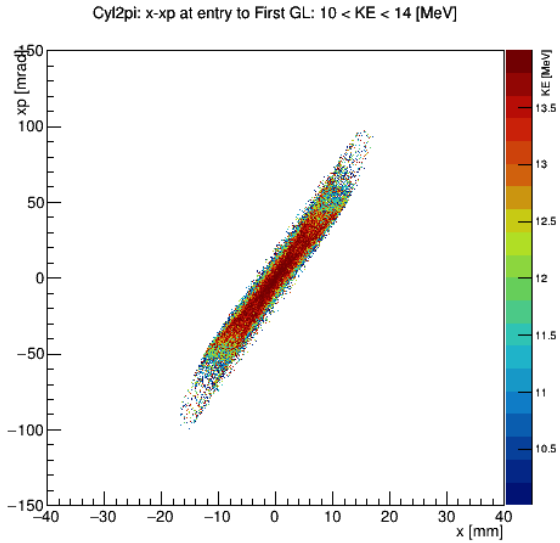
Phase space at entry to first Gabor lens (x-xp)

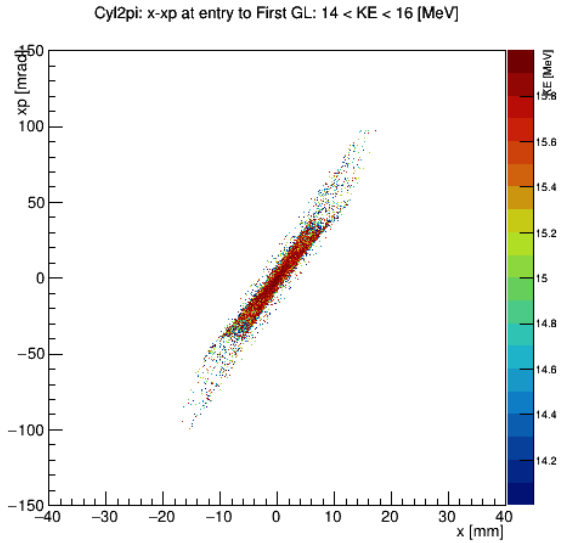
x-xp phase space for cylindrical 2pi smear:

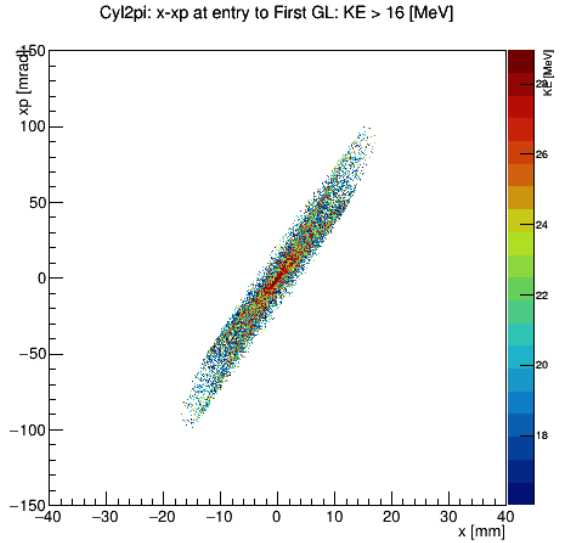






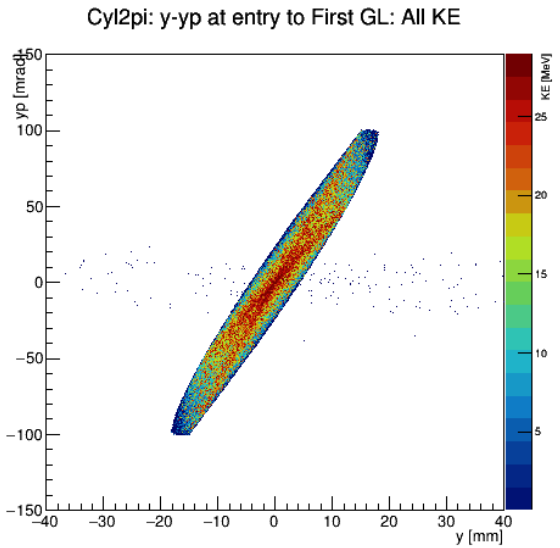


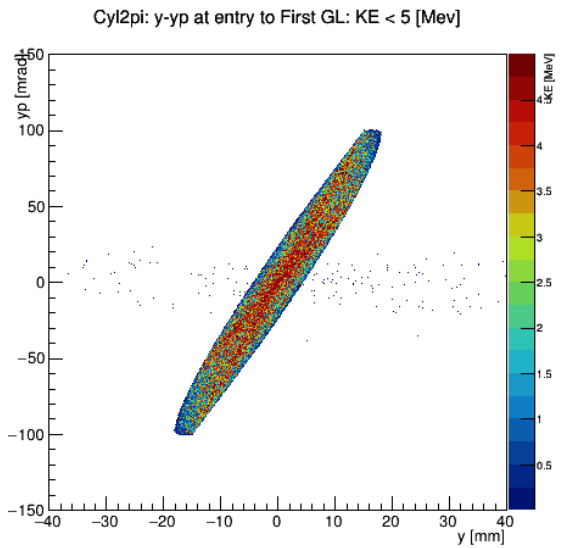


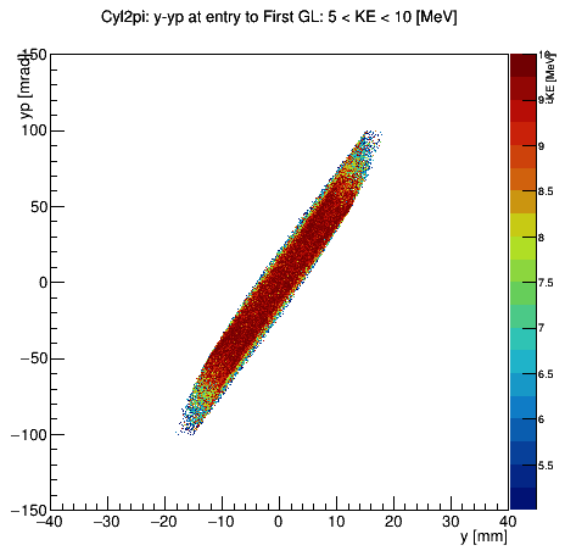


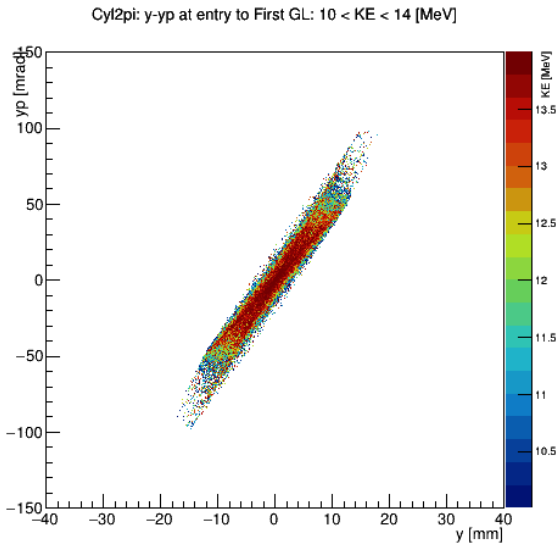
Phase space at entry to first Gabor lens (y-yp)

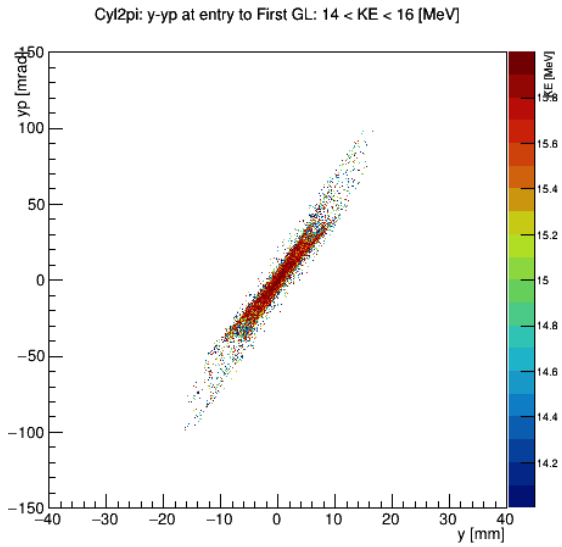
y-yp phase space for cylindrical 2pi smear:

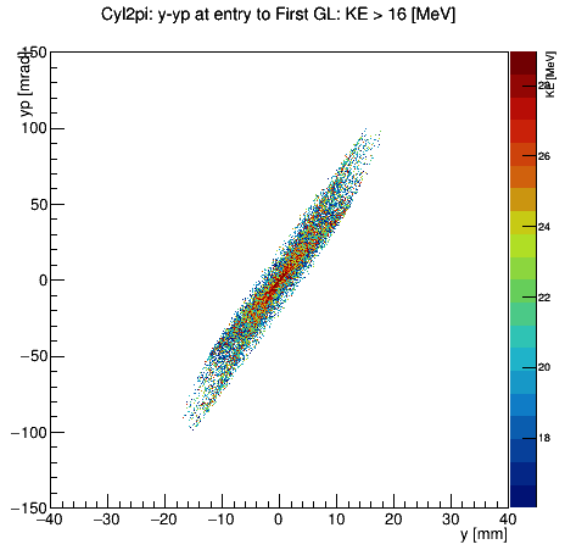




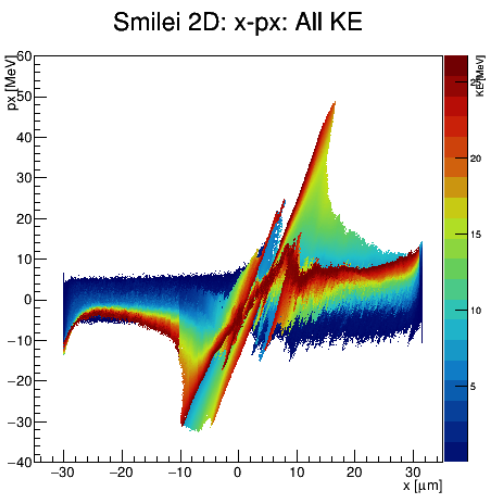


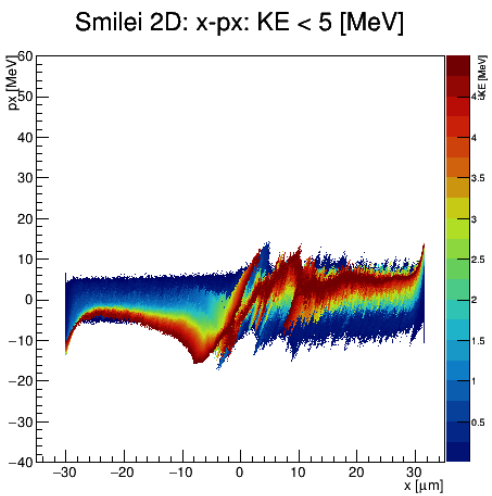


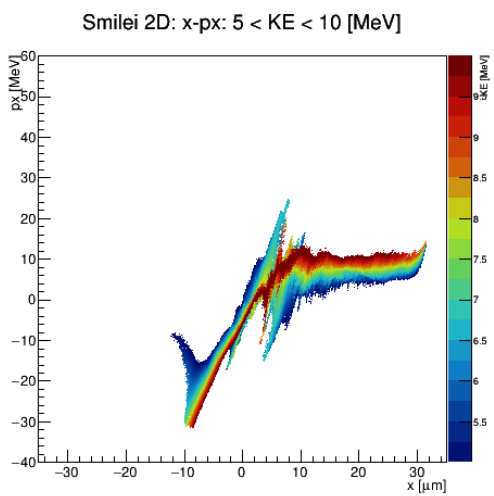


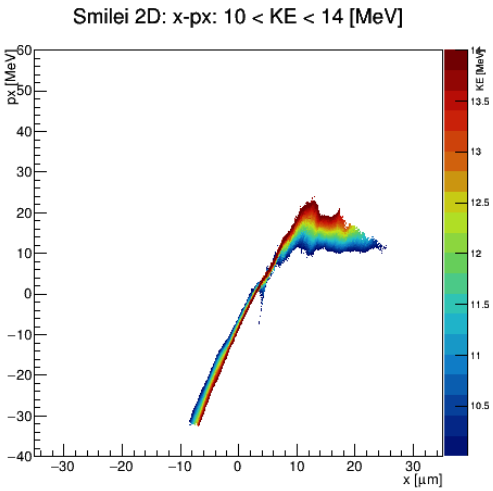


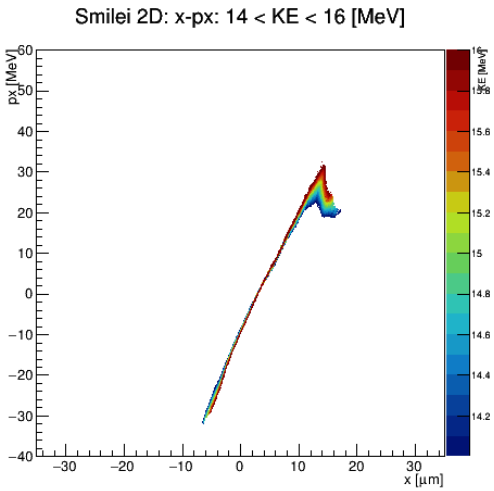
Smilei 2D: x-px and z-pz

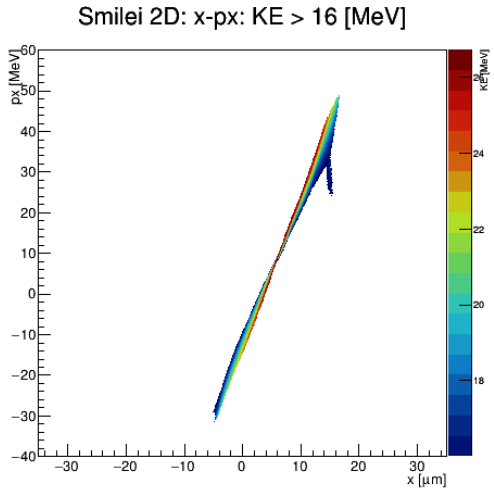












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