

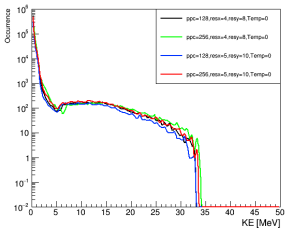
# LhARA: Meeting

Hin Tung Lau

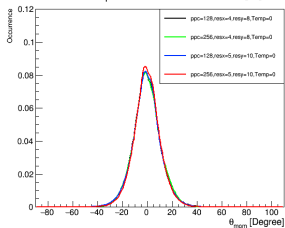
October 22, 2020

# Convergence of ppc and cell size

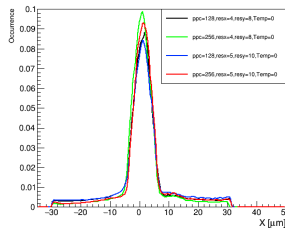
Proton KE Histogram: Time =  $998 \pm 10$  [fs]



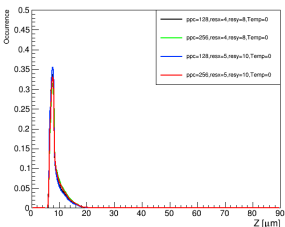
Proton  $\theta_p$ -PDF: Time =  $998 \pm 10$  [fs]



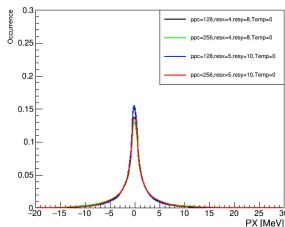
Proton X-PDF: Time =  $998 \pm 10$  [fs]



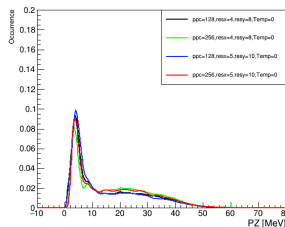
Proton Z-PDF: Time =  $998 \pm 10$  [fs]



Proton PX-PDF: Time =  $998 \pm 10$  [fs]



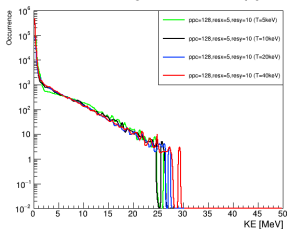
Proton PZ-PDF: Time =  $998 \pm 10$  [fs]



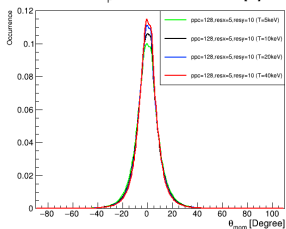
Comparing black and green curve (higher resolution) appears that convergence reached.

# Initial temperature of foil

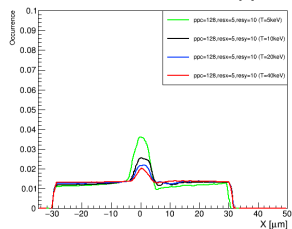
Proton KE Histogram: Time =  $998 \pm 10$  [fs]



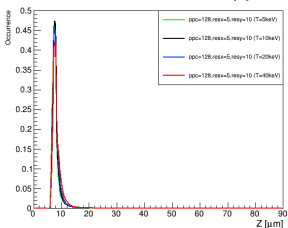
Proton  $\theta_p$ -PDF: Time =  $998 \pm 10$  [fs]



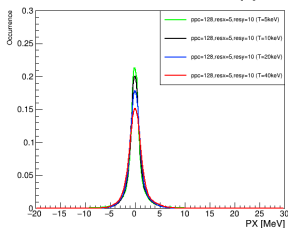
Proton X-PDF: Time =  $998 \pm 10$  [fs]



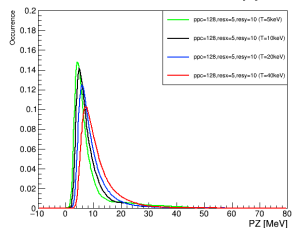
Proton Z-PDF: Time =  $998 \pm 10$  [fs]



Proton PX-PDF: Time =  $998 \pm 10$  [fs]



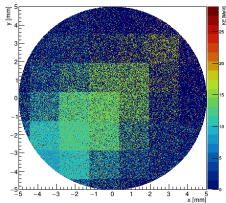
Proton PZ-PDF: Time =  $998 \pm 10$  [fs]



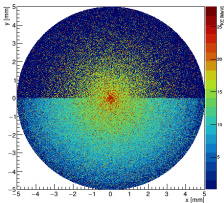
# Comparison of 3D Smearing

No scaling of momentum.

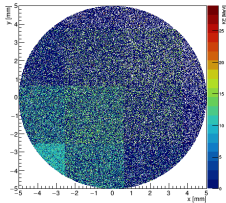
Cartesian at Collimator Start



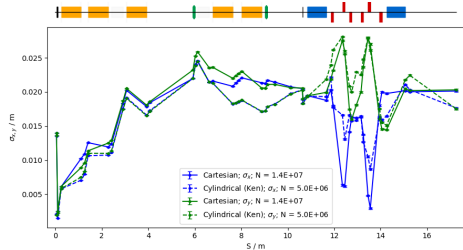
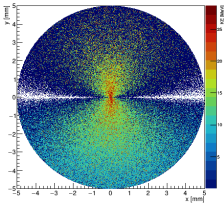
Cylindrical at Collimator Start



Cartesian at Collimator End



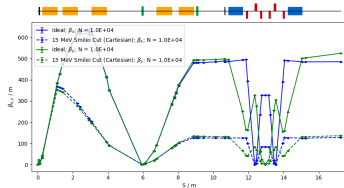
Cylindrical at Collimator End



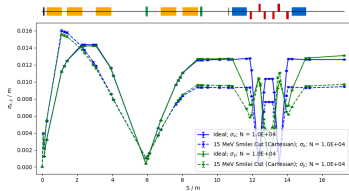
# Tuning beamline (15 MeV adjusted cut of cartesian smear)

Tuning first three Gabor lenses can make beam size smaller at end station, and Twiss plots look more similar to ideal. (Not shown but there is a mismatch with MAD-X optics.)

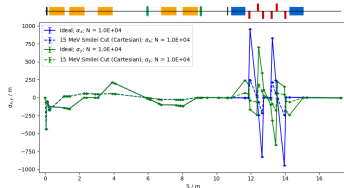
### Beta Plot



### Sigma Plot



### Alpha Plot



# Tuning Beamline (Dirty adjusted cartesian smear)

Needs more tuning for dirty beam.

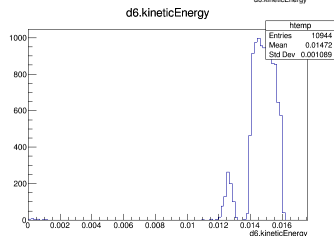
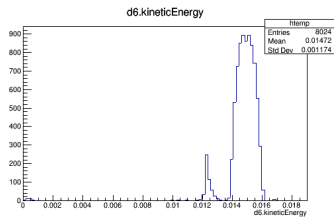


Figure: Untuned (top) and tuned (bottom).

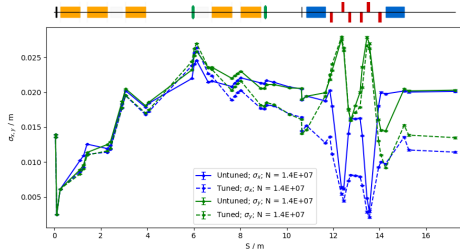
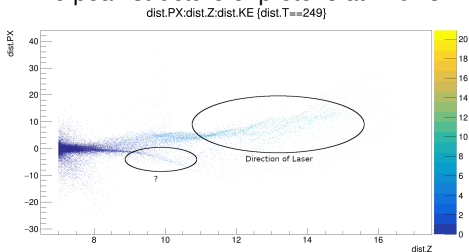


Figure: Untuned (solid) and tuned (dashed).

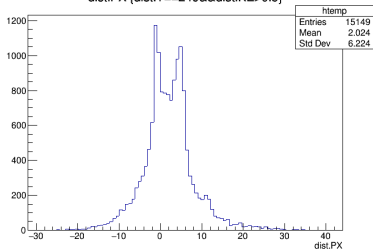
# Reminder: Double peak feature in transverse momentum

## Two peak structure of protons at 249 ns.



## SMILEI

dist.PX (dist.T==249&&dist.KE>0.5)



## Old EPOCH (unknown timestep)

dist.PX (dist.KE>0.5)

