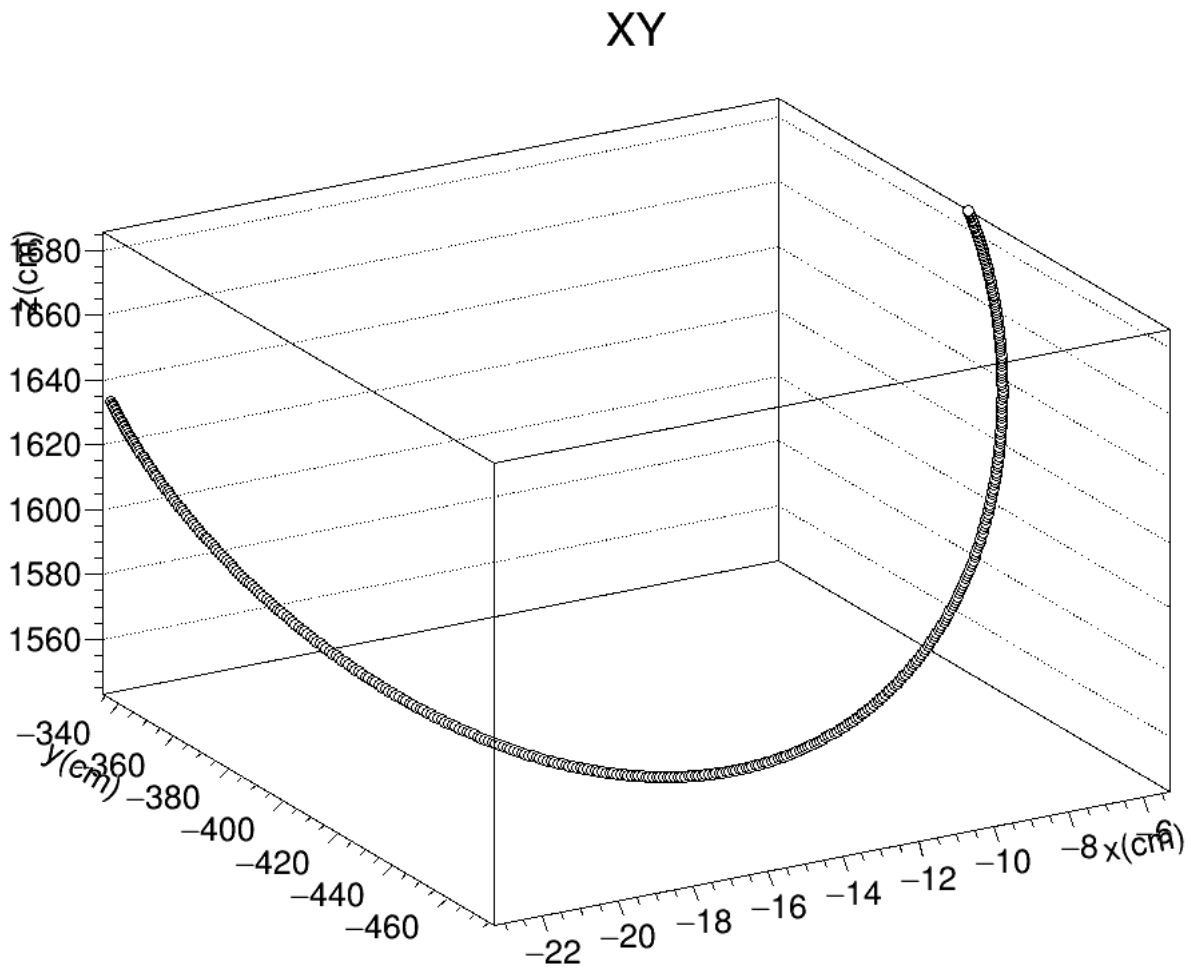
TOY MONTE CARLO MACRO

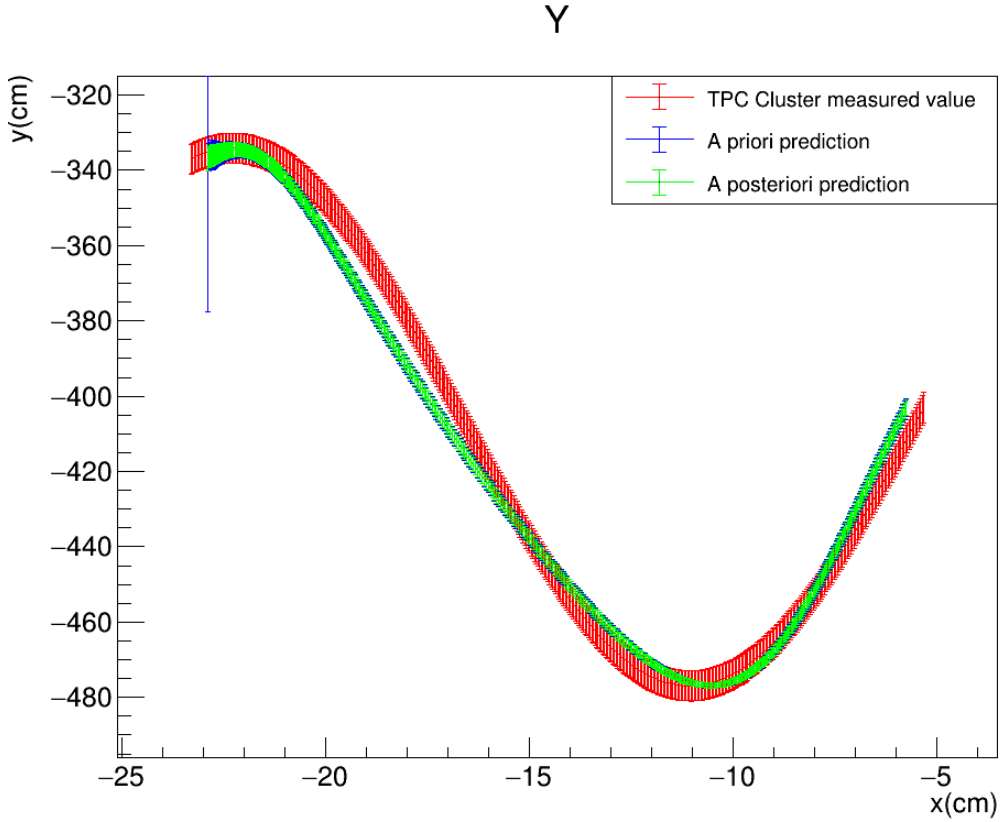
- Made a new ROOT macro, which produces a Toy Montecarlo file and applies our Kalman Filter to it
- This is now completely independent from the art infrostructure and can be run directly from my machine
- Also, while it produces the same final results it is structured differently so that the toy Montecarlo and Kalman filter application are not done in parallel anymore, but are done one after the other.
- This allows for both a simple file with just xyz info and a post kalman filter file with all the info to be produced quite naturally



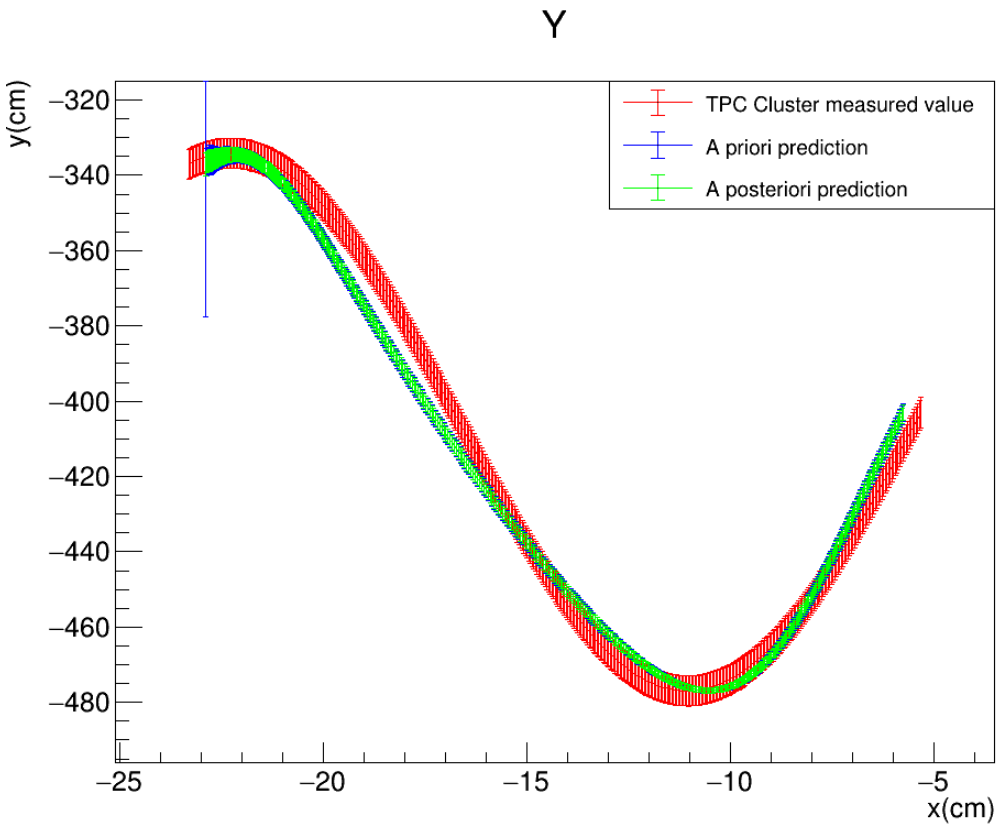
TOY MONTE CARLO

KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

- To check that the Macro is working properly I compare the original helix plots with the ones produced using the new macro



Old modified art module



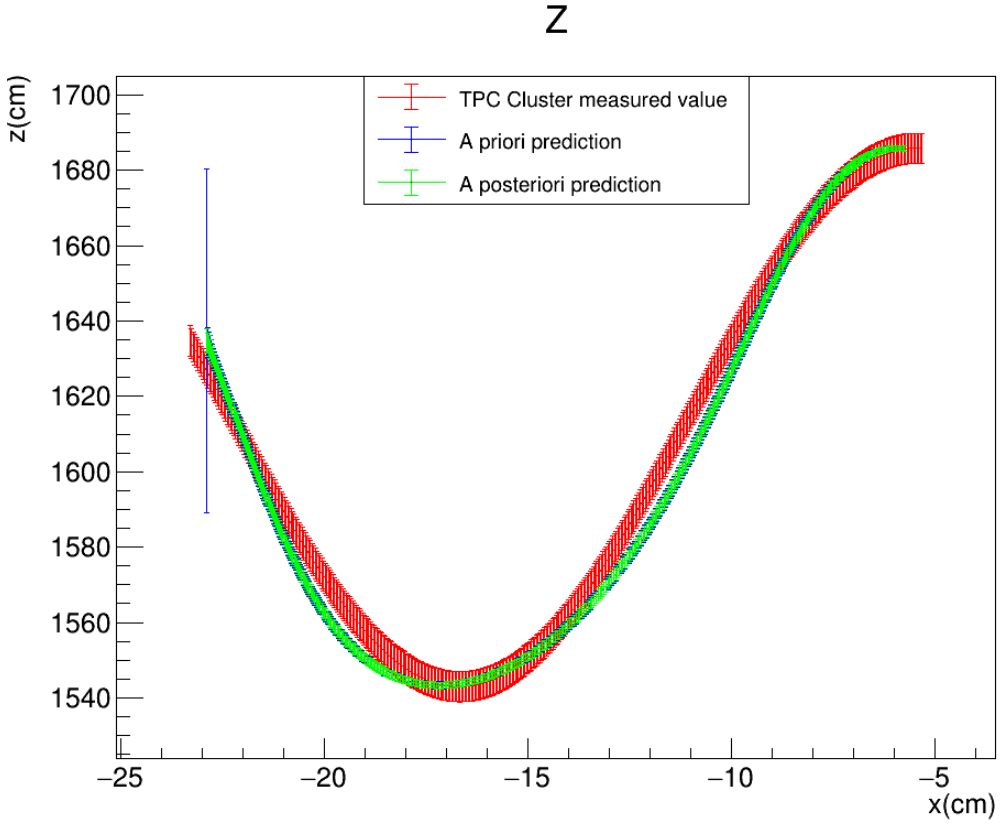
New ROOT macro

FILTER PROPAGATION DIRECTION

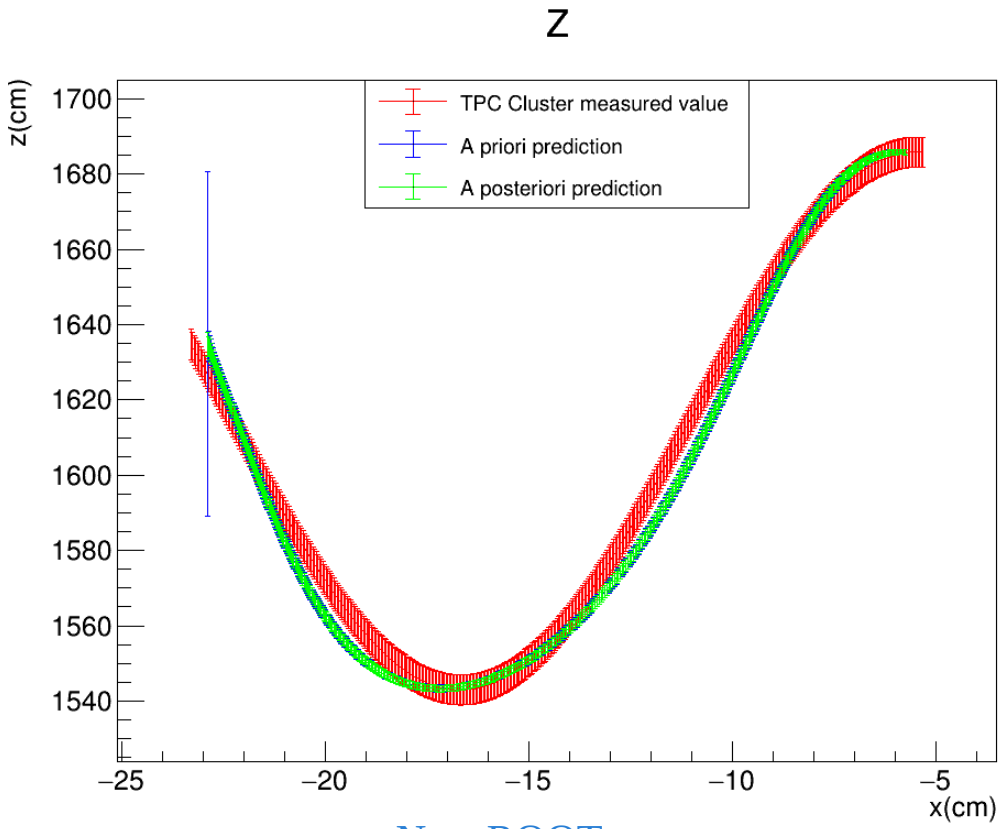
TOY MONTE CARLO

KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

- To check that the Macro is working properly I compare the original helix plots with the ones produced using the new macro



Old modified art module

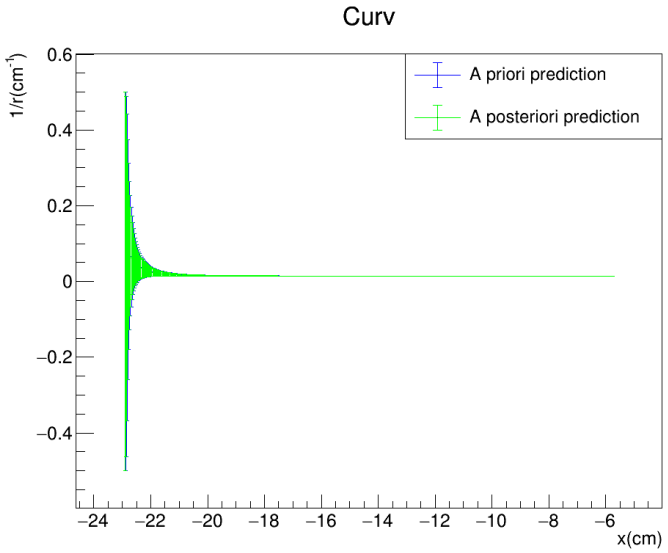


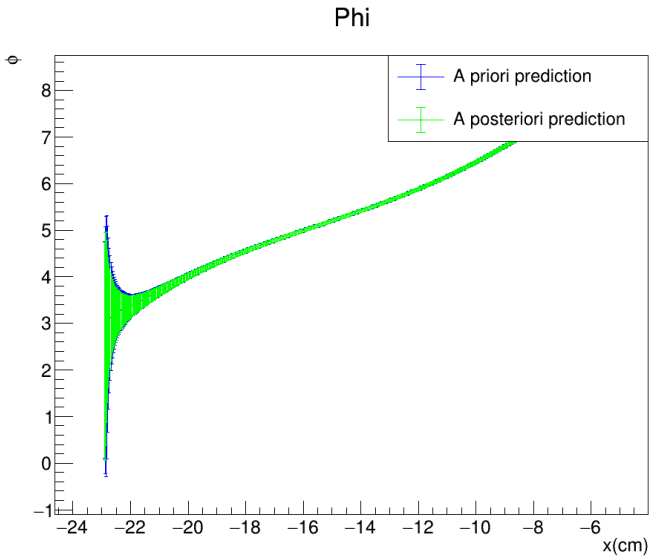
New ROOT macro

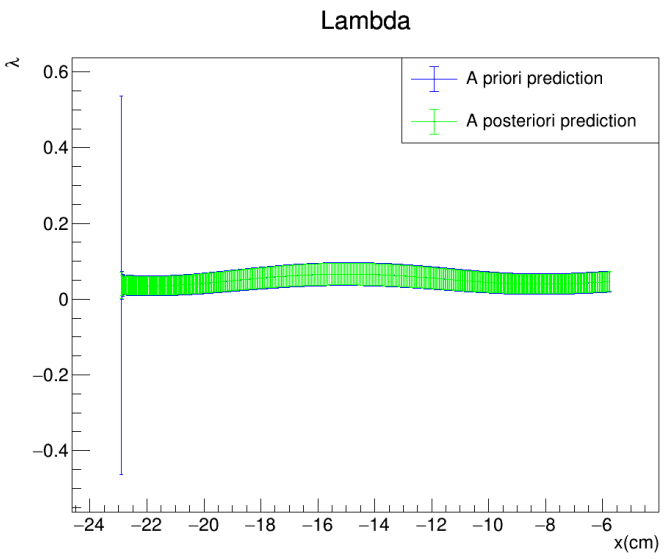
FILTER PROPAGATION DIRECTION

TOY MONTE CARLO

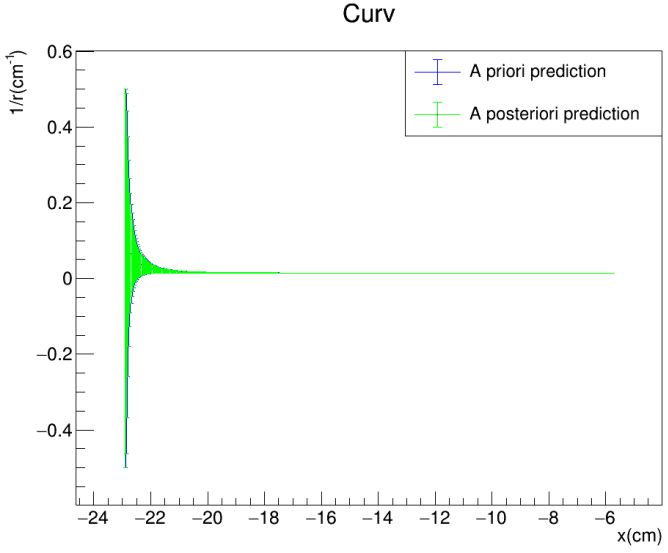
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

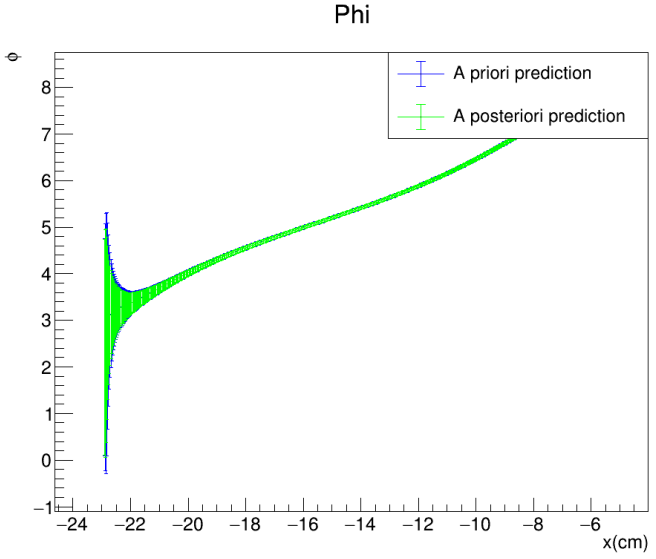


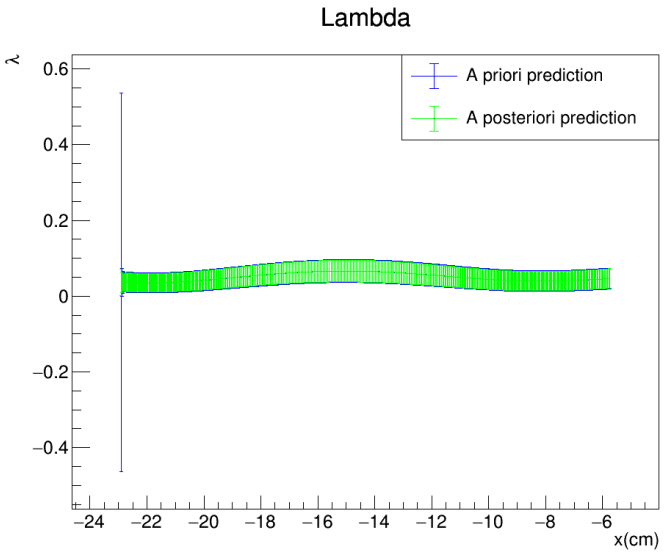




Old modified art module





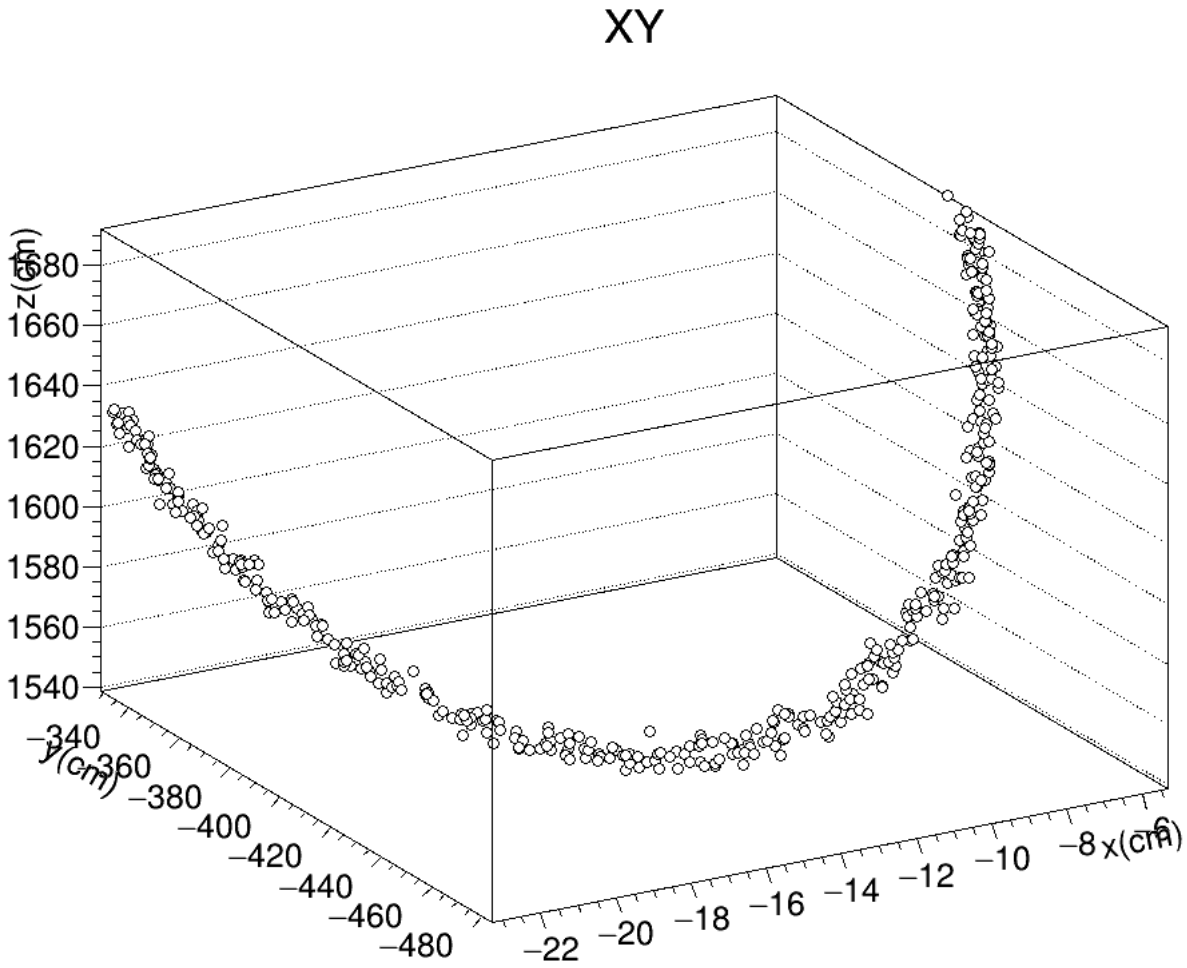


FILTER PROPAGATION DIRECTION

New ROOT macro

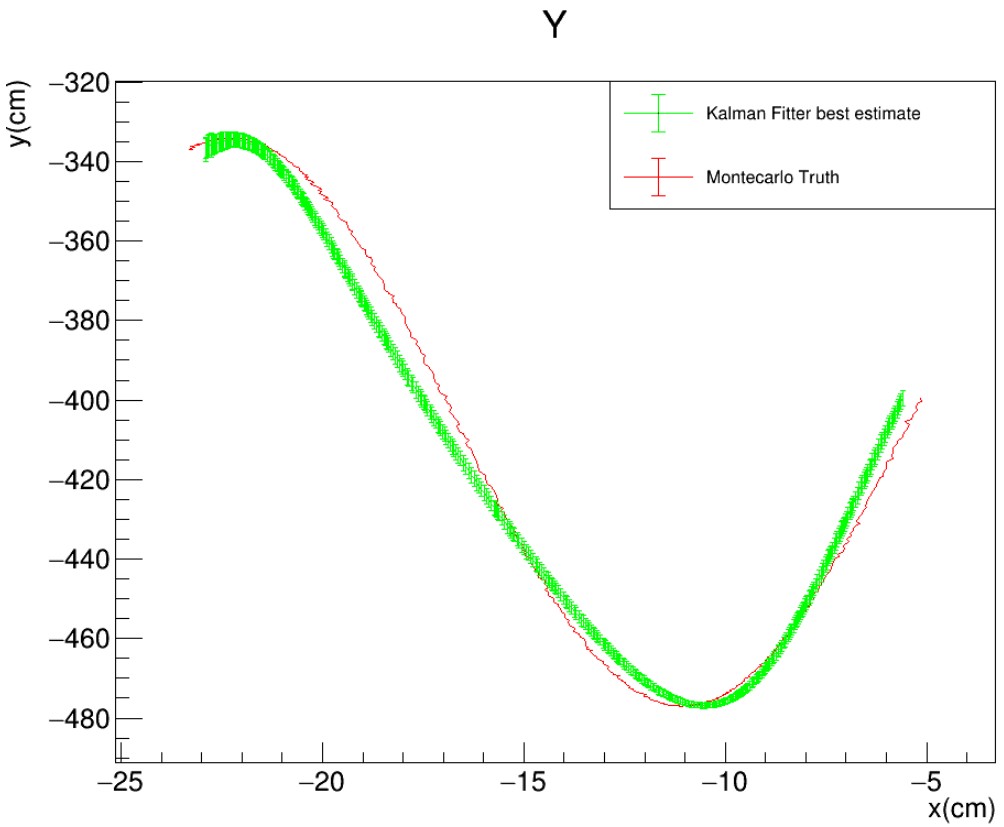
TOY MONTE CARLO MACRO

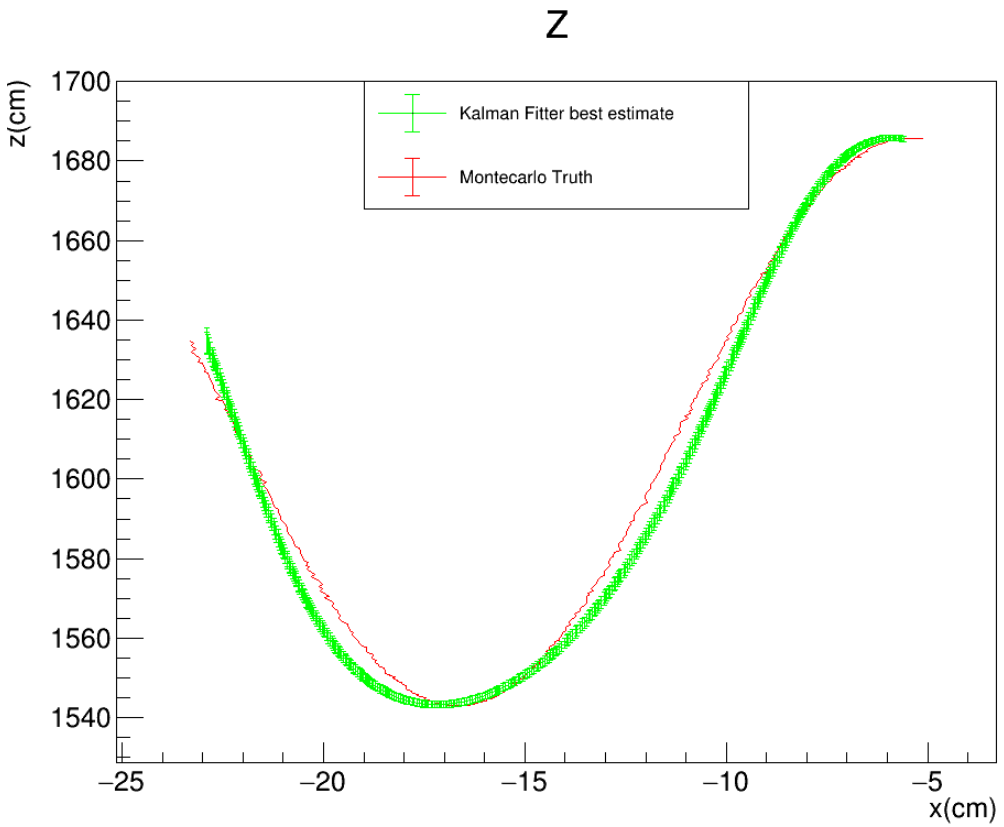
- I produced Toy Montecarlo files with randomized dx step uniformely distributed between 0.02cm and 0.06cm and smeared coordinates
- Proceeded in order smearing first the coordinates individually, then two at a time than all 3 at the same time
- I applied Gaussian smearing to the three coordinates having sigmas: $\sigma^{x}_{Gauss} = 0.04cm$ and $\sigma^{y}_{Gauss} = \sigma^{z}_{Gauss} = 3cm$
- I applied our Kalman Filter™ with $(\sigma_x, \sigma_y) = (0.5cm, 1cm)$



3D plot of the helix when all three coordinates are smeared

TOY MONTE CARLO: SMEARED X



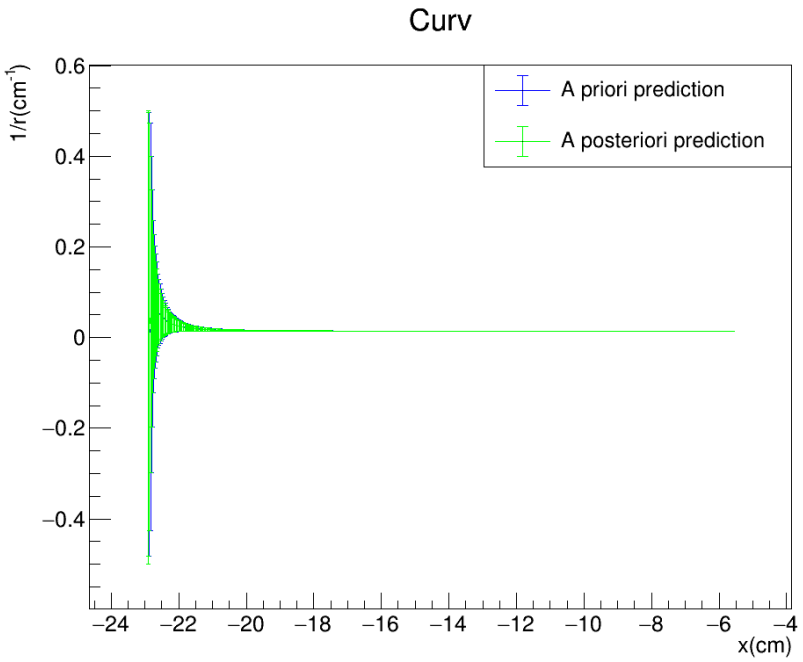


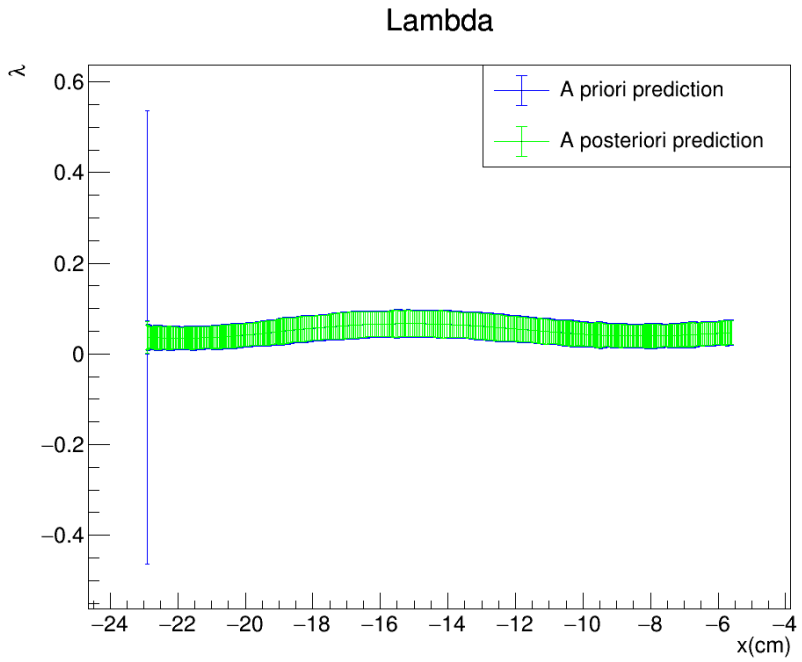
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

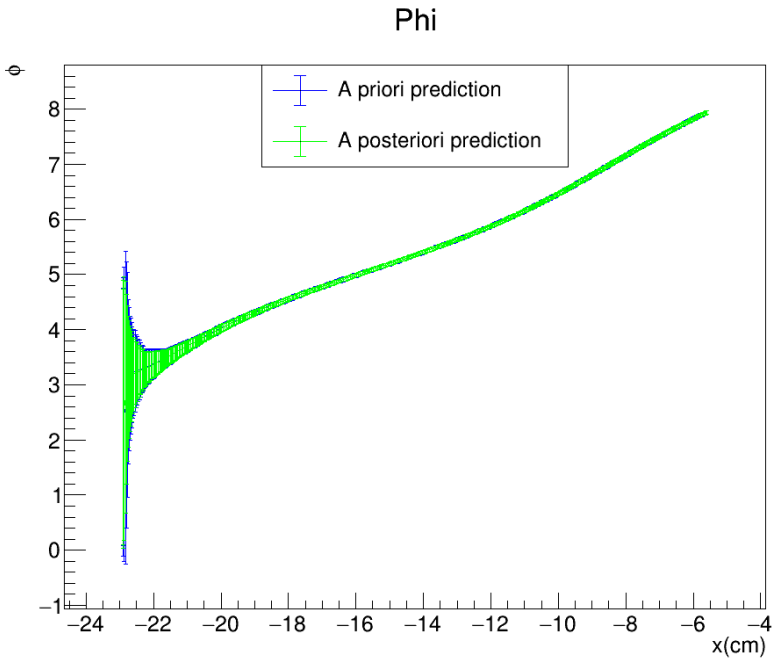
Gauss: $\sigma^x_{Gauss} = 0.04cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED X





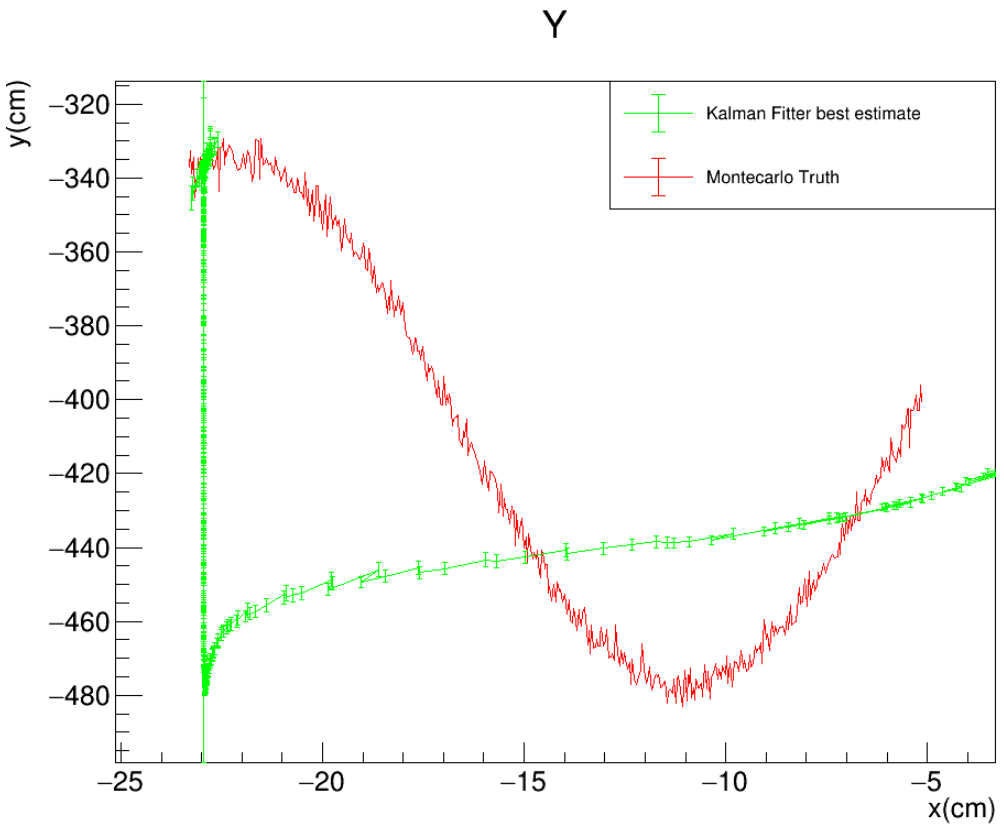


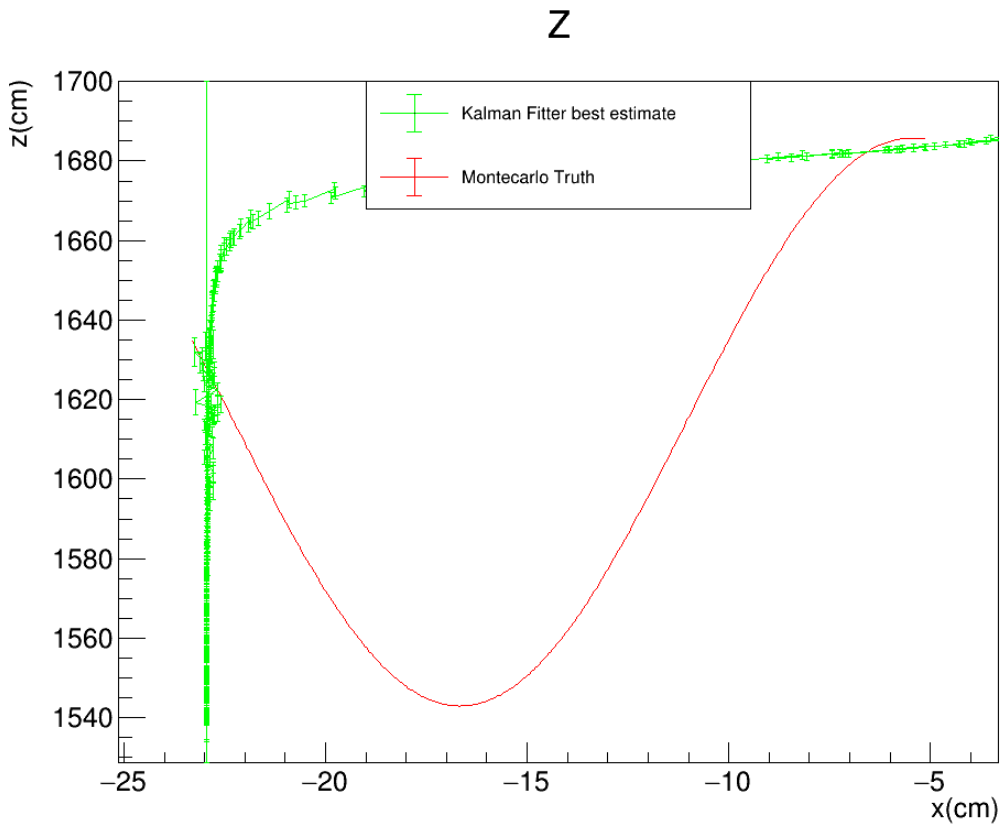
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $\sigma^x_{Gauss} = 0.04cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED Y



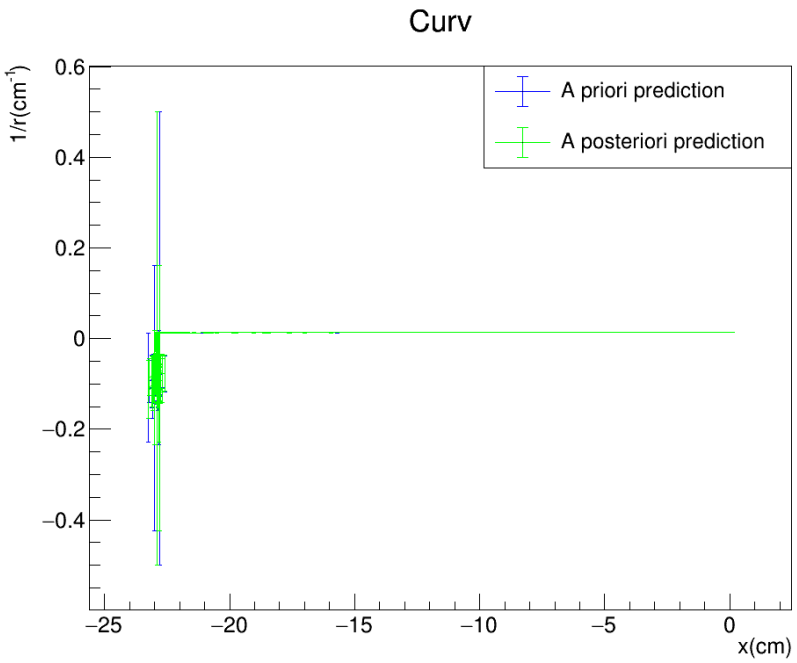


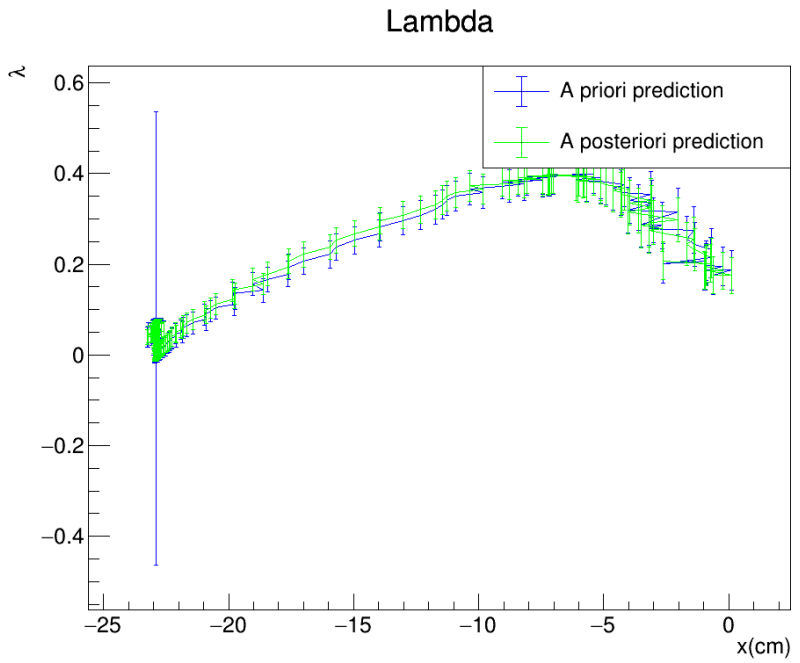
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

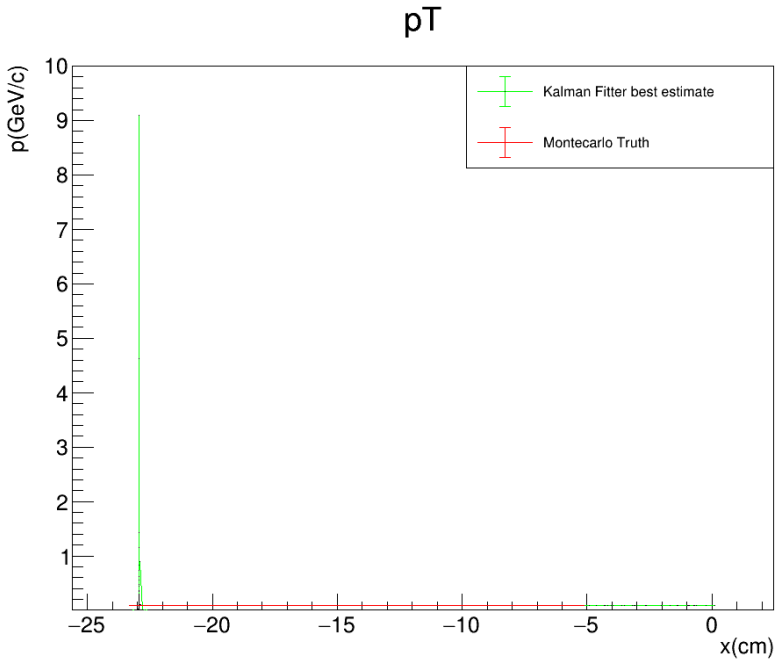
Gauss: $\sigma^{y}_{Gauss} = 3cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED Y





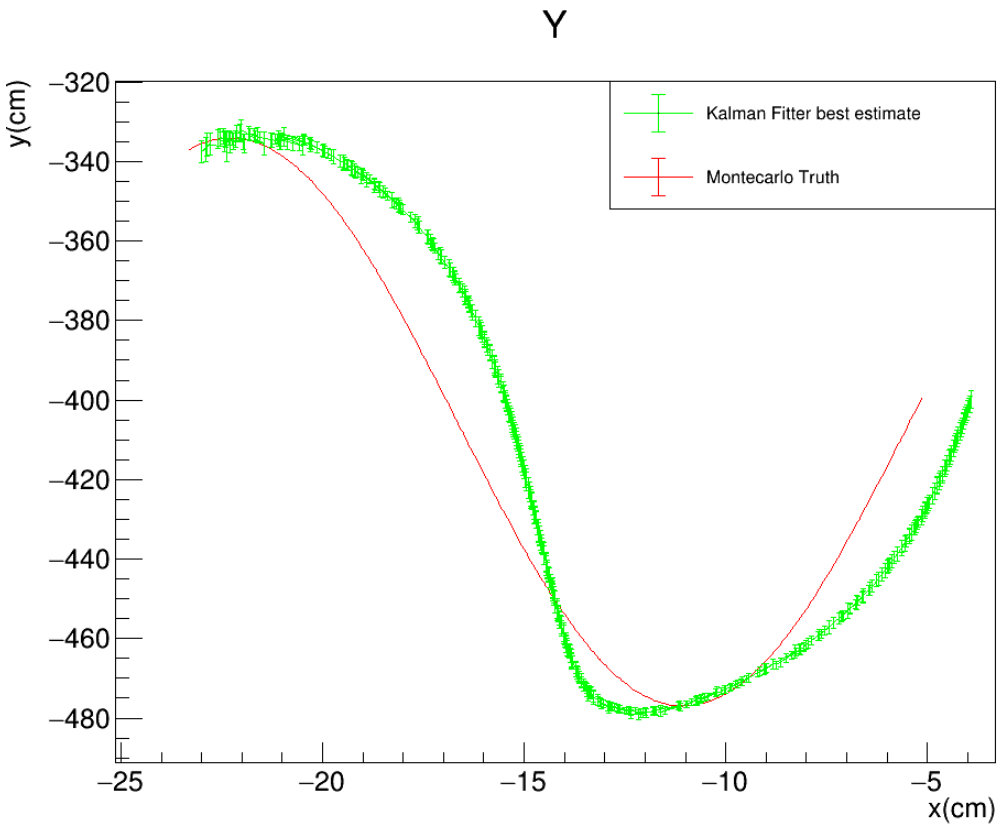


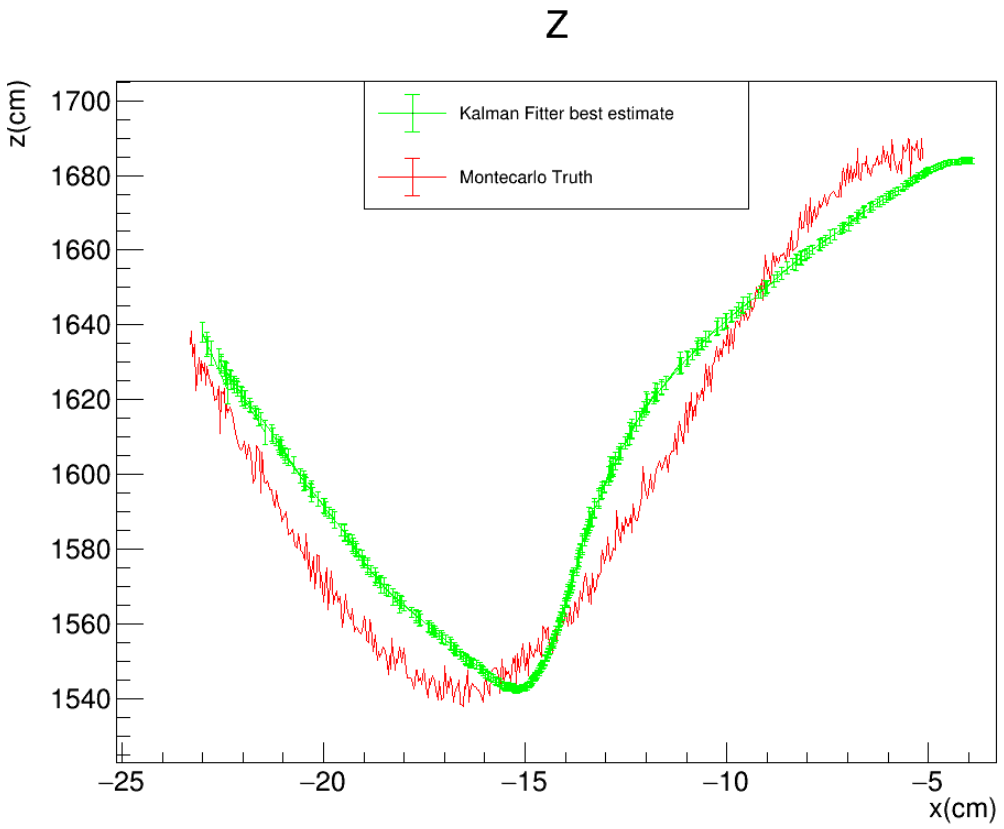
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $\sigma^y_{Gauss} = 3cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED Z



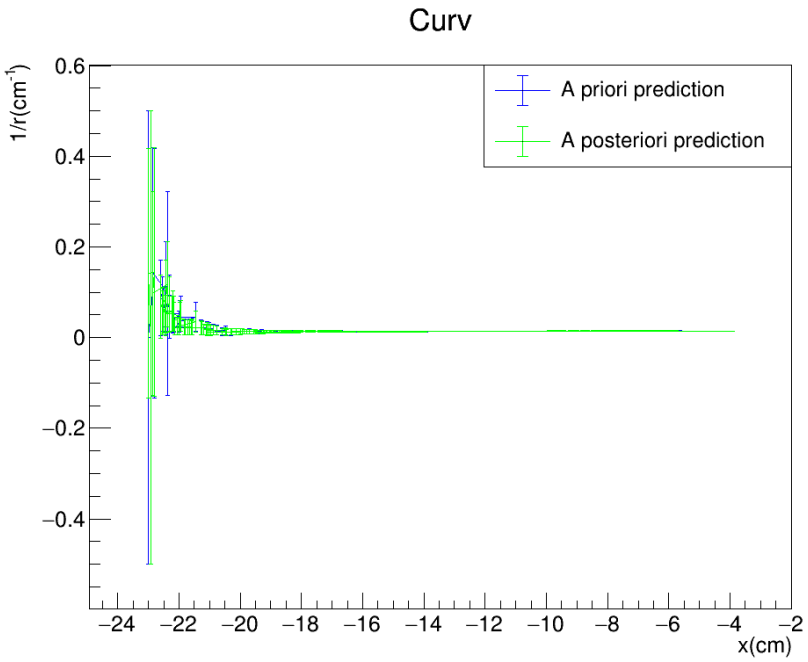


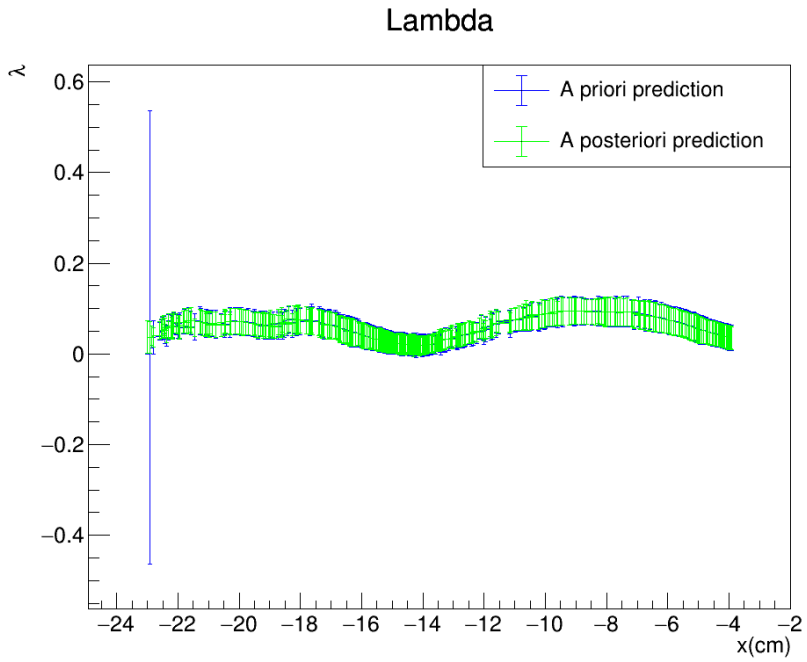
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

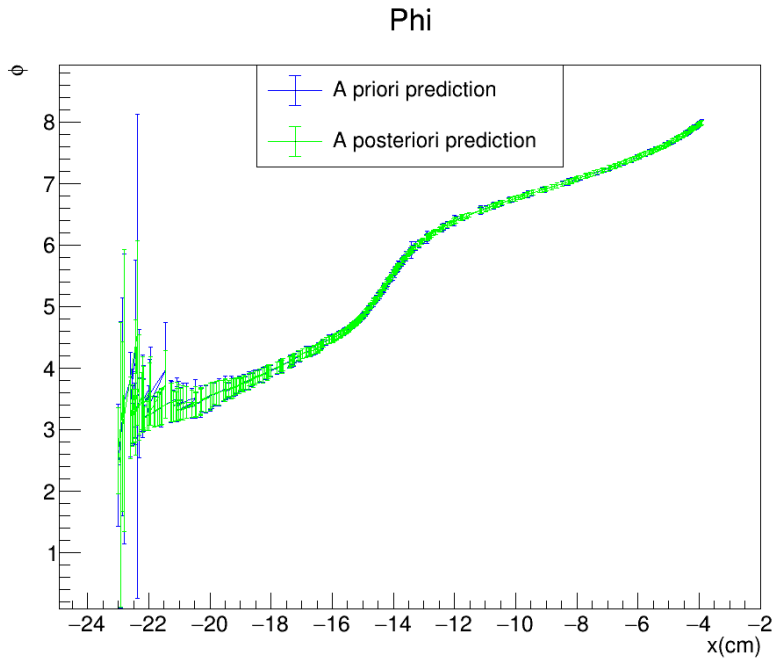
Gauss: $\sigma^z_{Gauss} = 3cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED Z





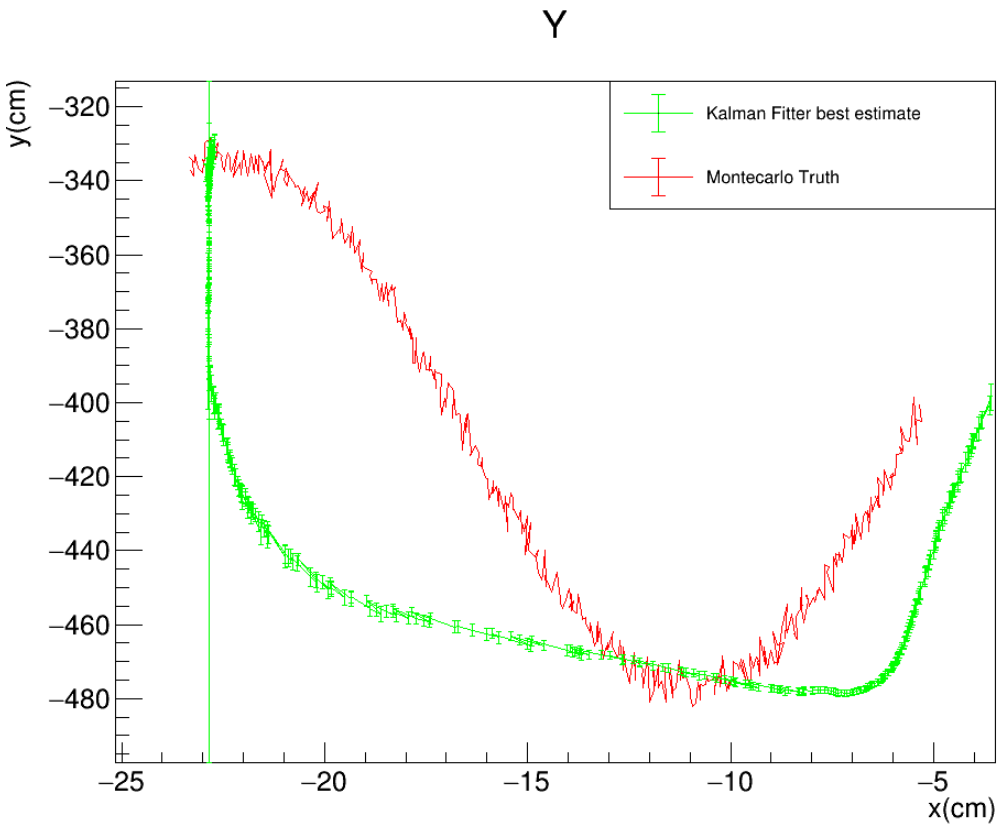


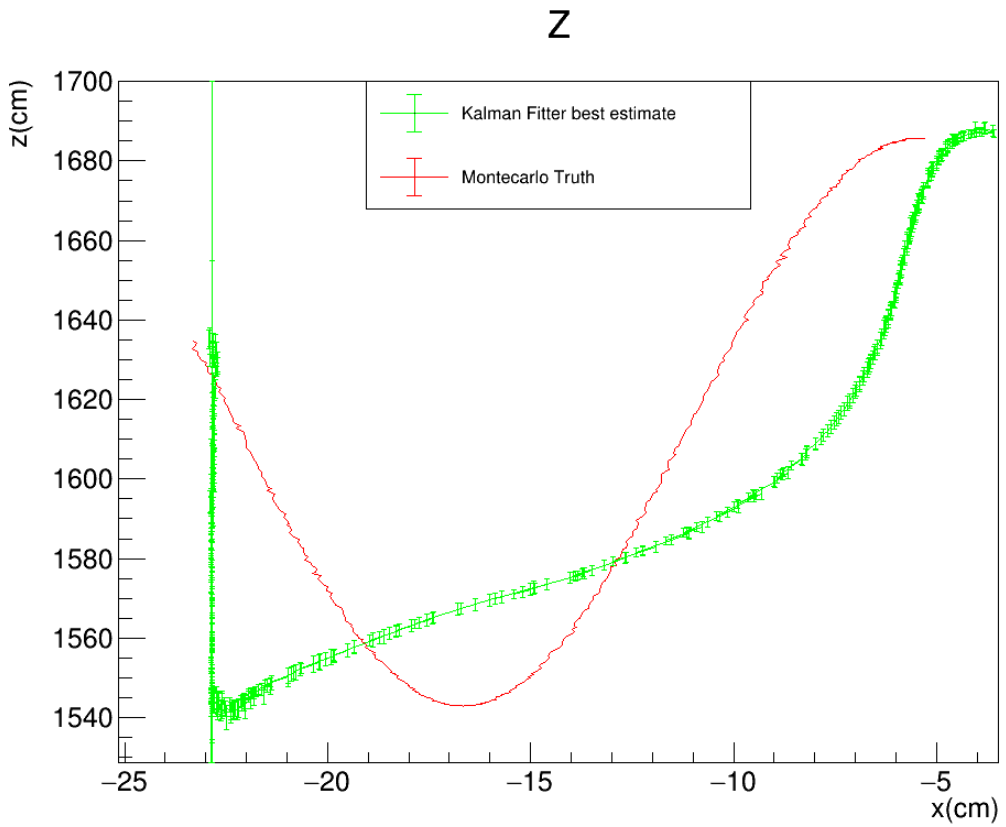
KF^{TM}: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $\sigma^x_{Gauss} = 3cm$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XY



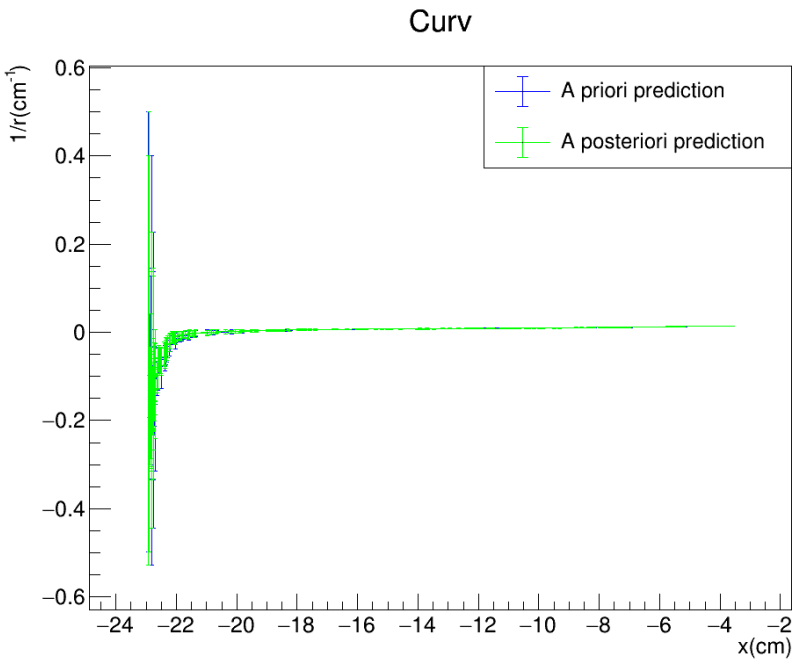


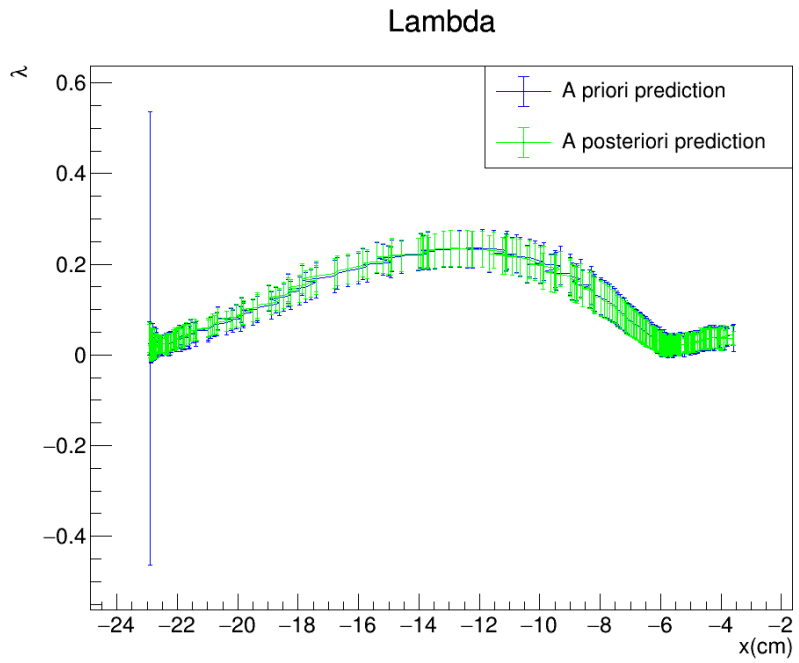
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

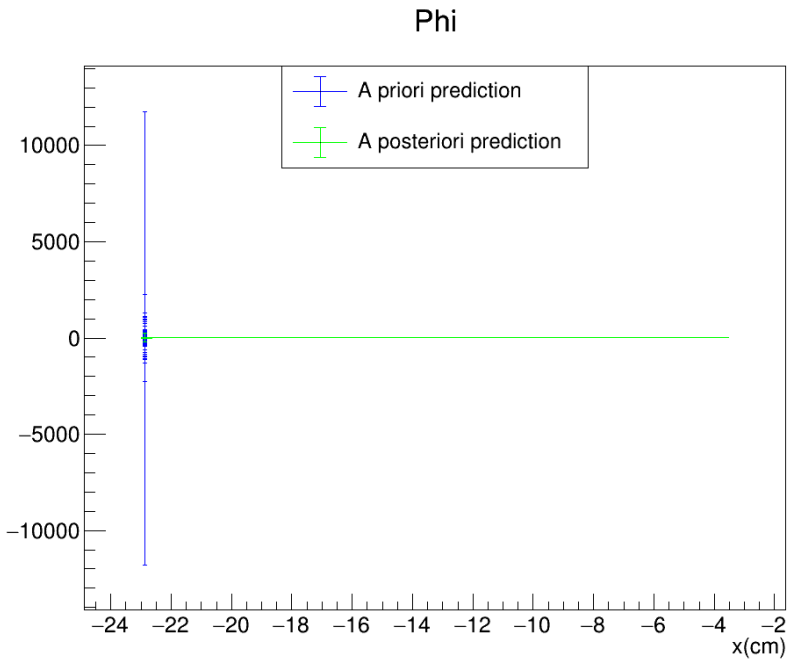
Gauss: $(\sigma^x_{Gauss}, \sigma^y_{Gauss}) = (0.04cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XY







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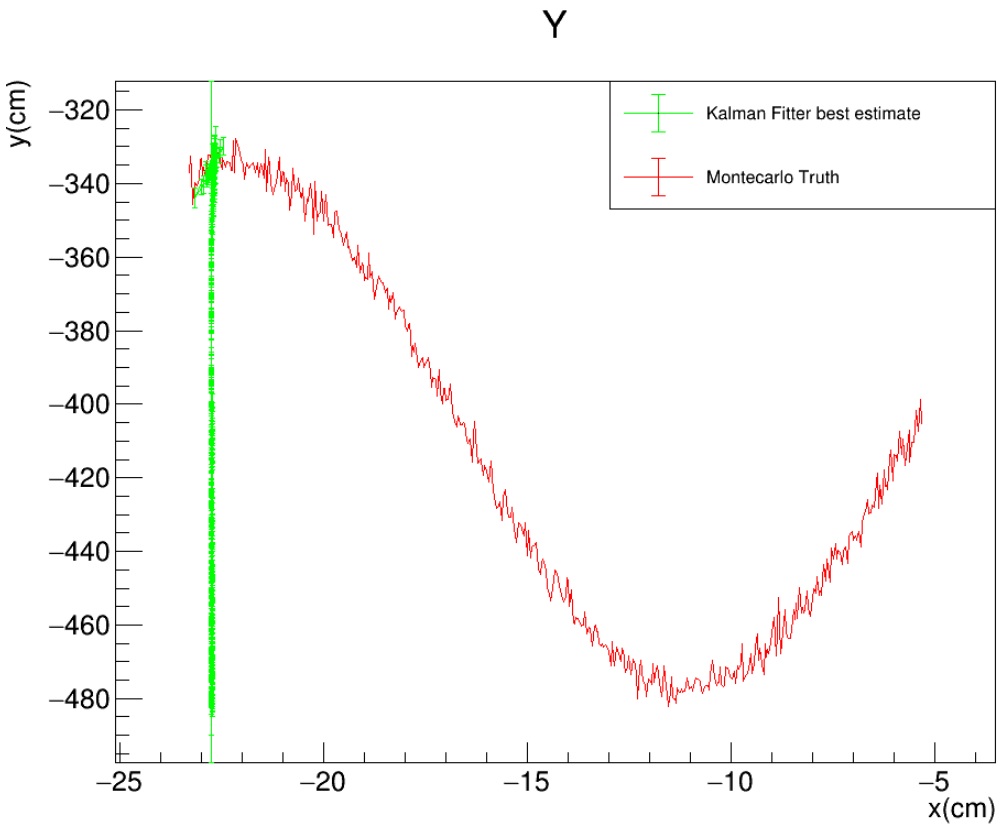
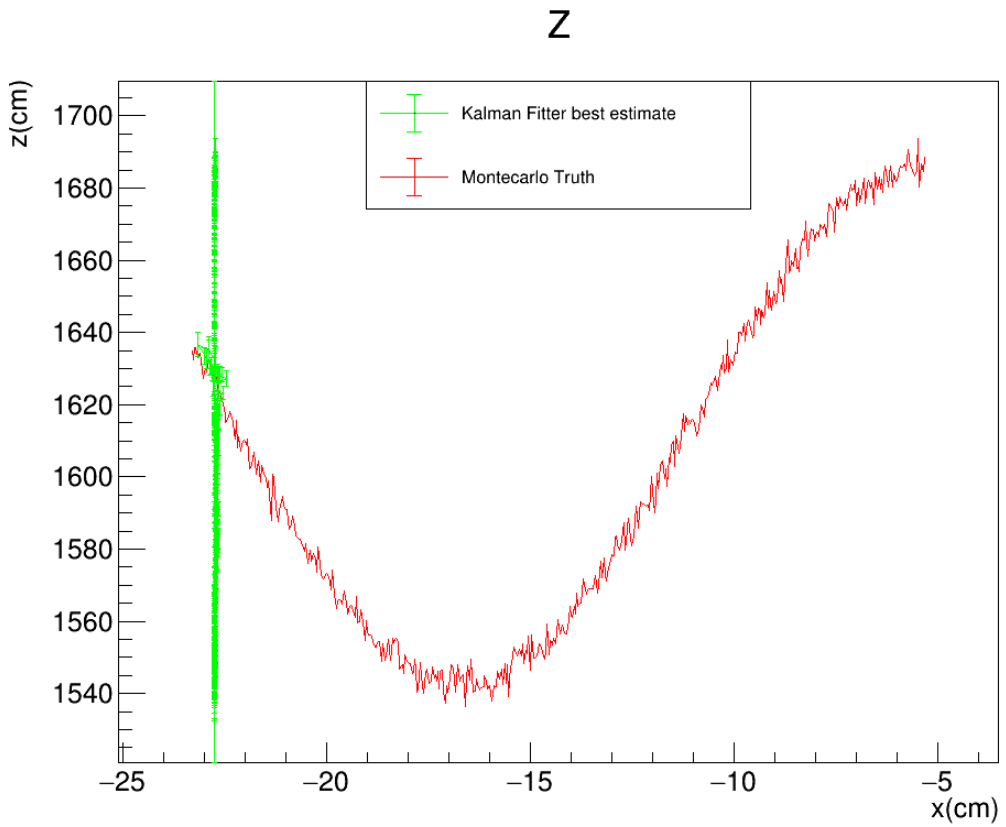
Gauss: $(\sigma^x_{Gauss}, \sigma^y_{Gauss}) = (0.04cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED YZ



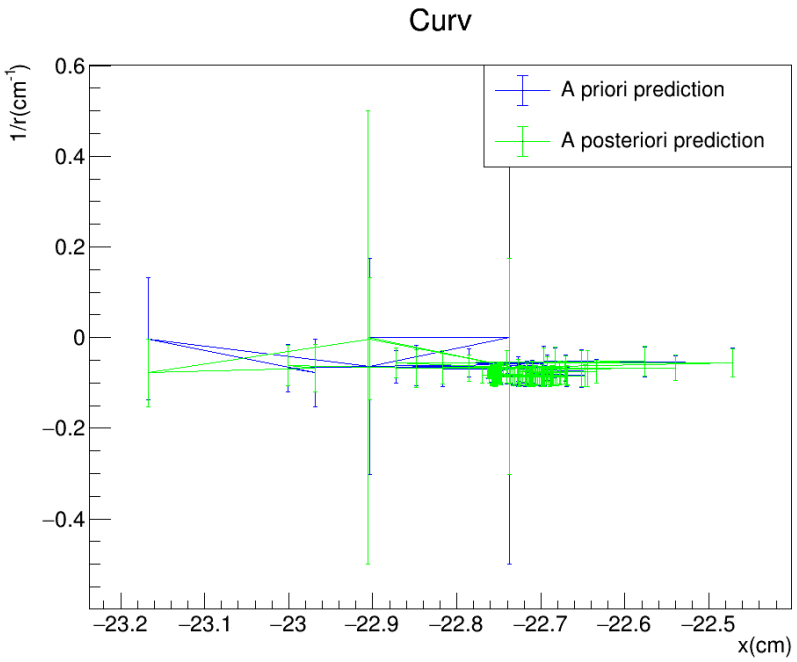


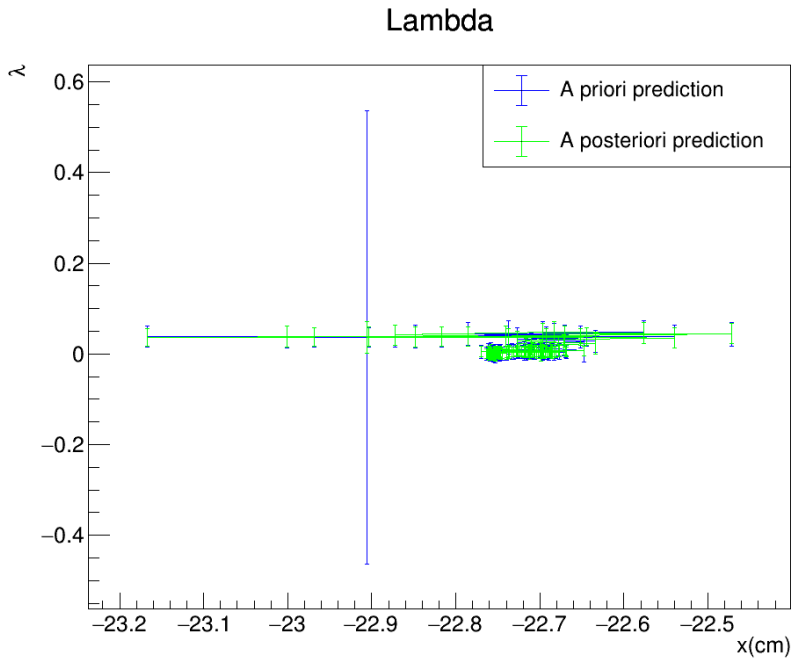
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

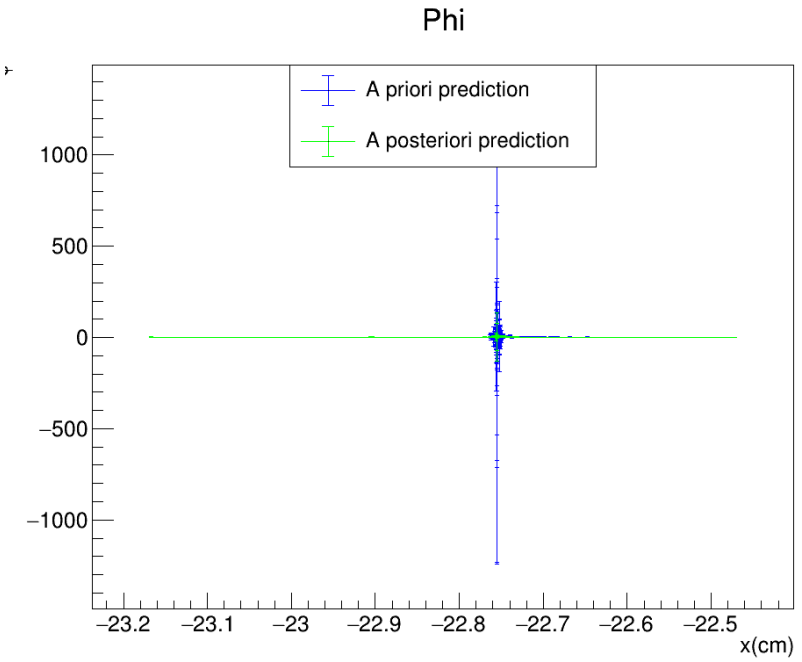
Gauss: $(\sigma^y_{Gauss}, \sigma^z_{Gauss}) = (3cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED YZ





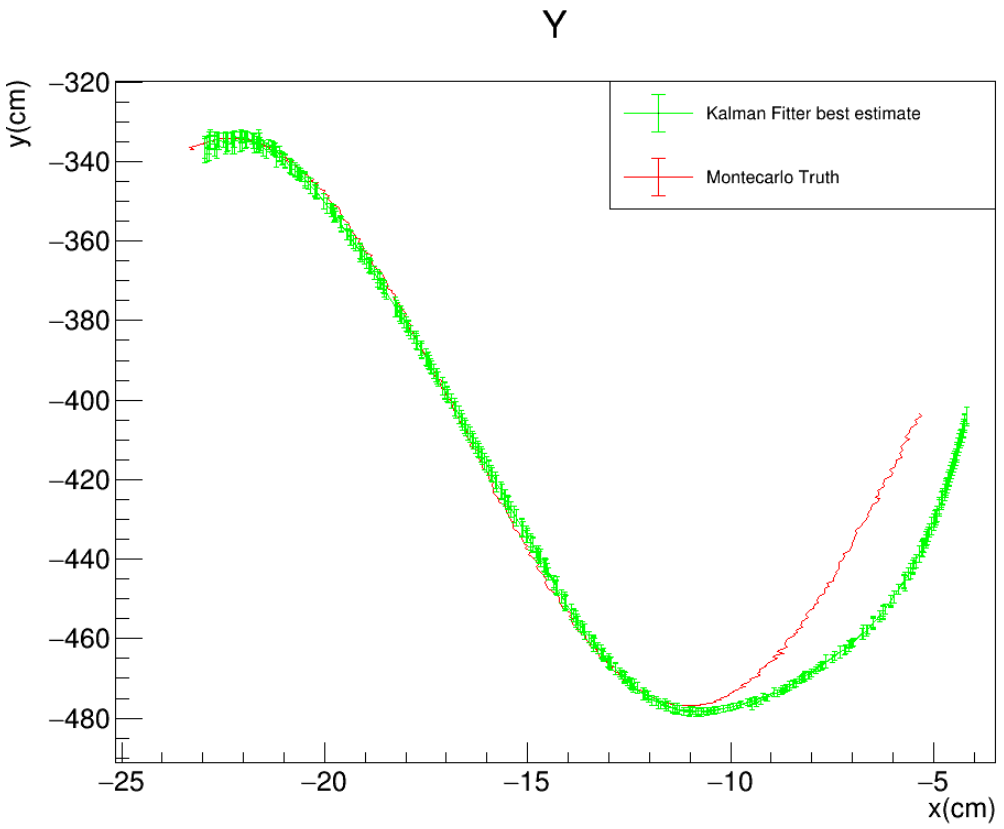


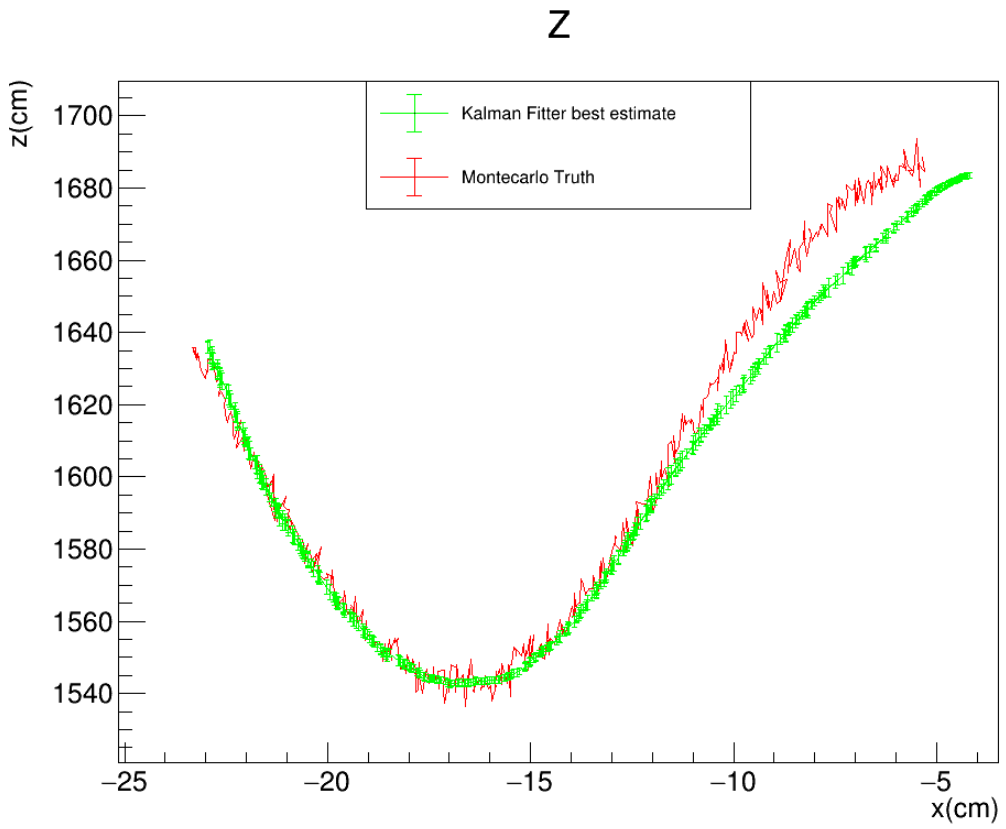
KF^{TM}: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $(\sigma^y_{Gauss}, \sigma^z_{Gauss}) = (3cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XZ



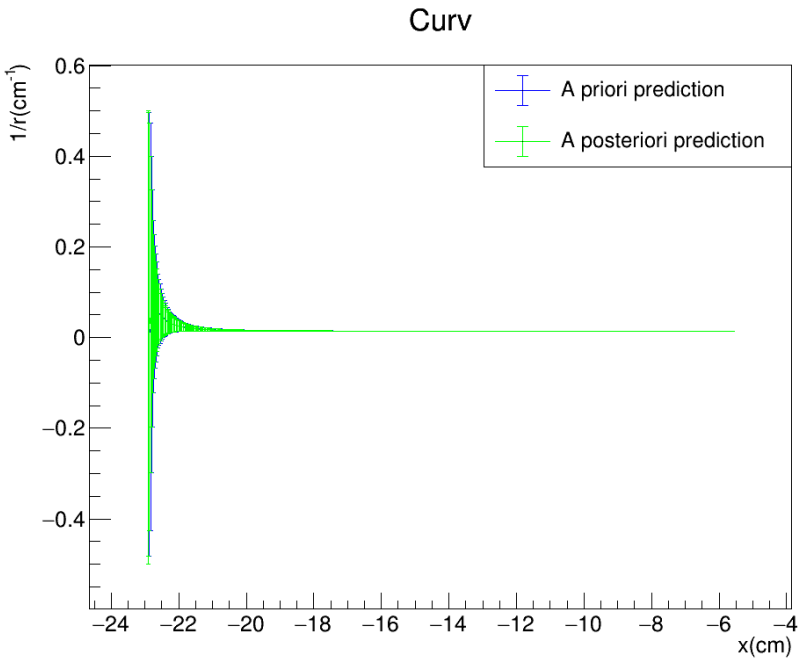


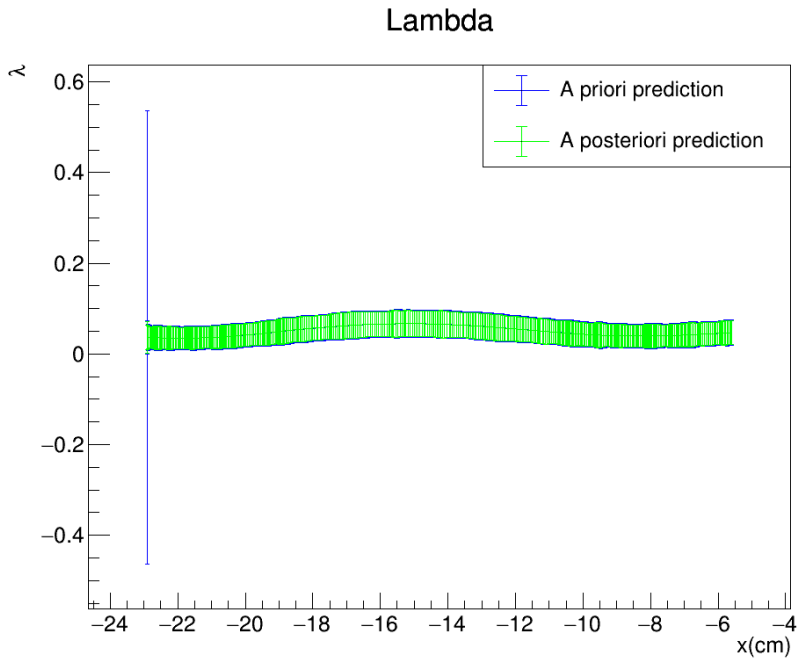
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

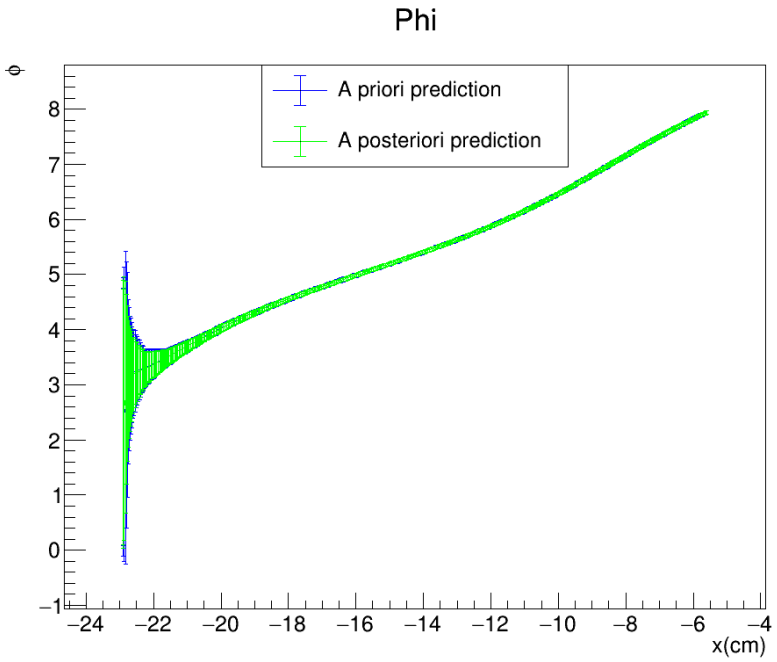
Gauss: $(\sigma^x_{Gauss}, \sigma^z_{Gauss}) = (0.04cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XZ





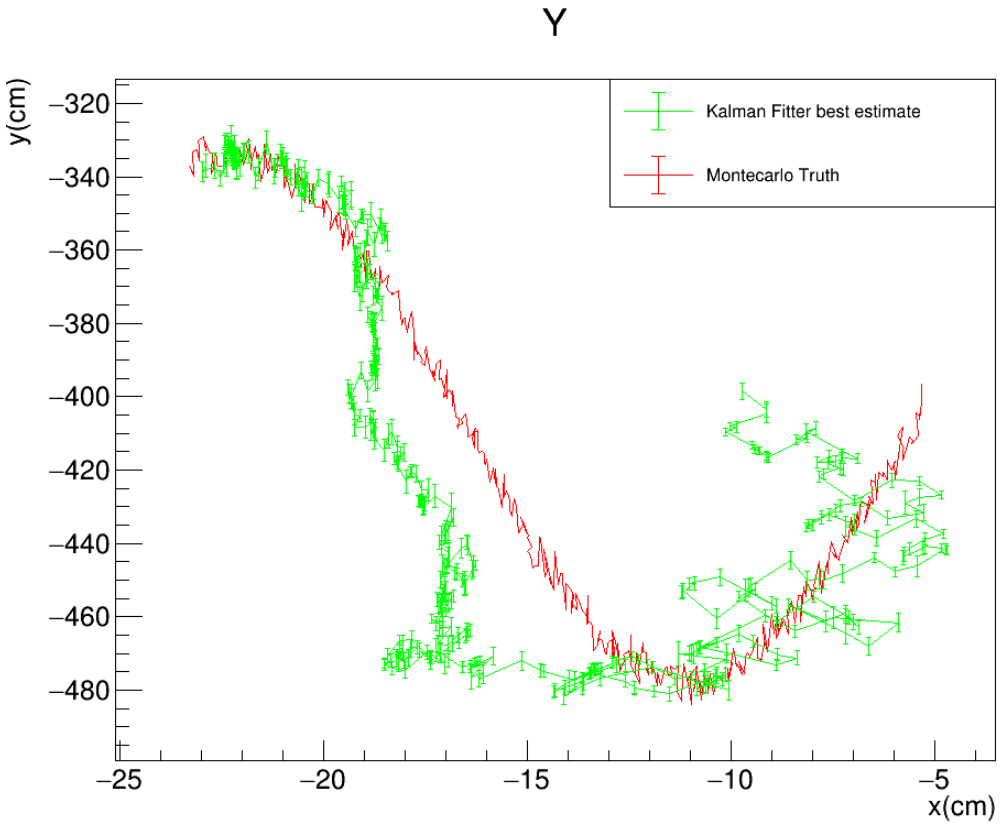


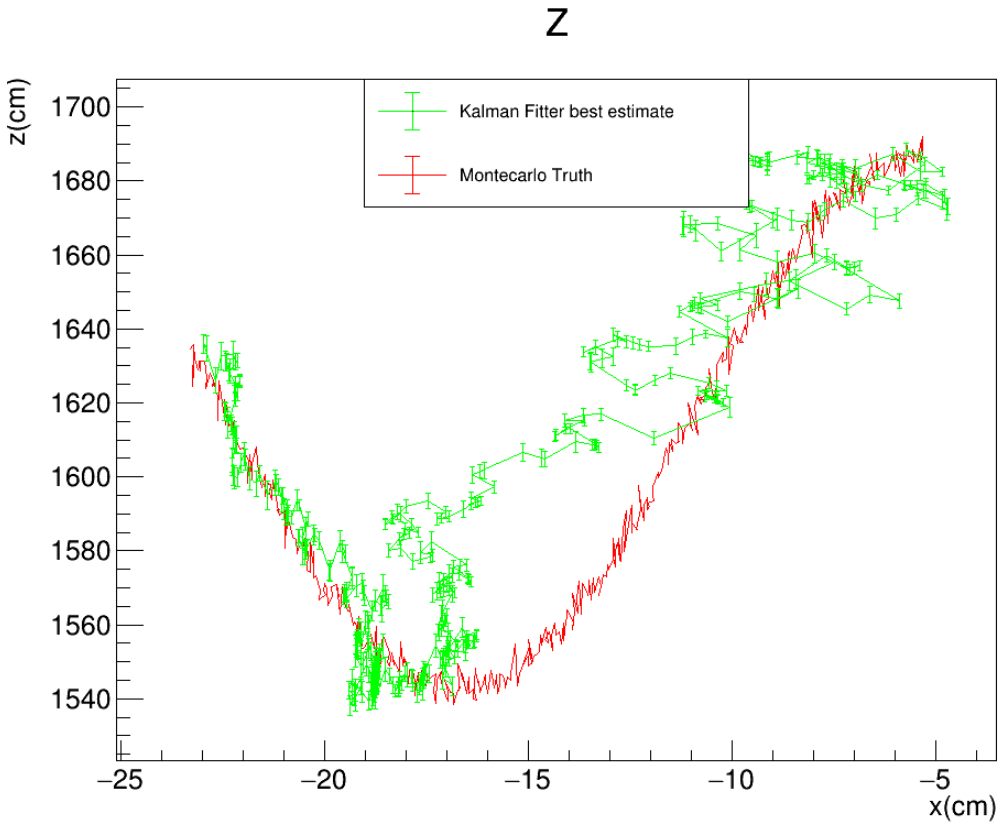
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $(\sigma^x_{Gauss}, \sigma^z_{Gauss}) = (0.04cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XYZ



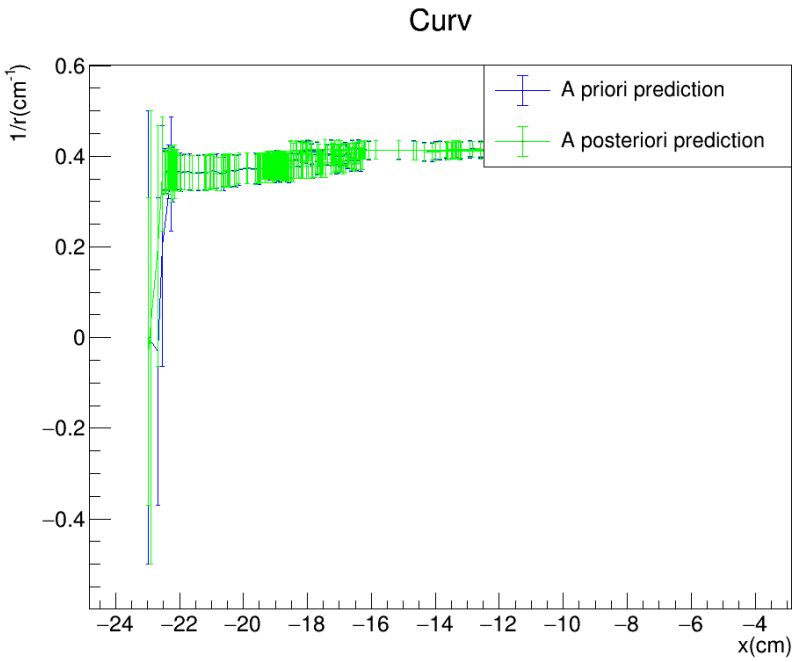


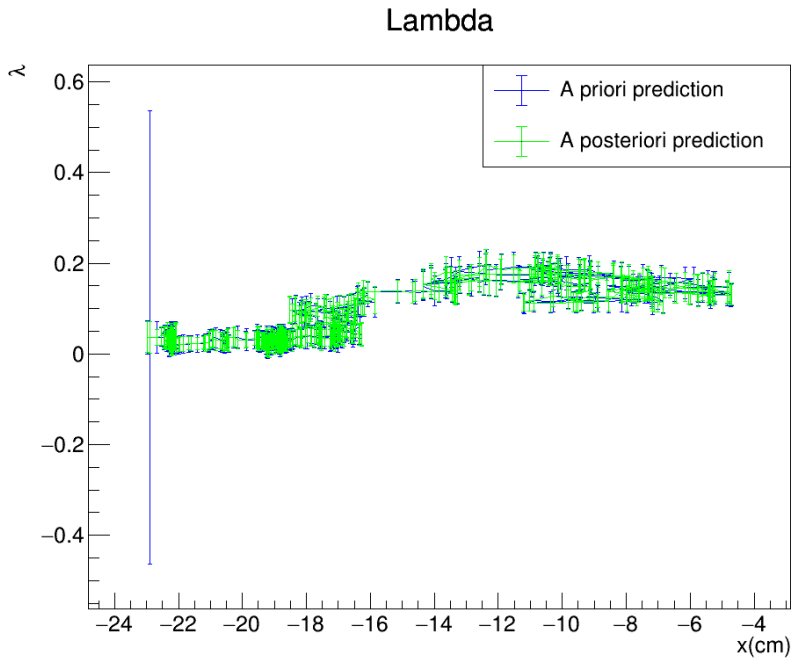
KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

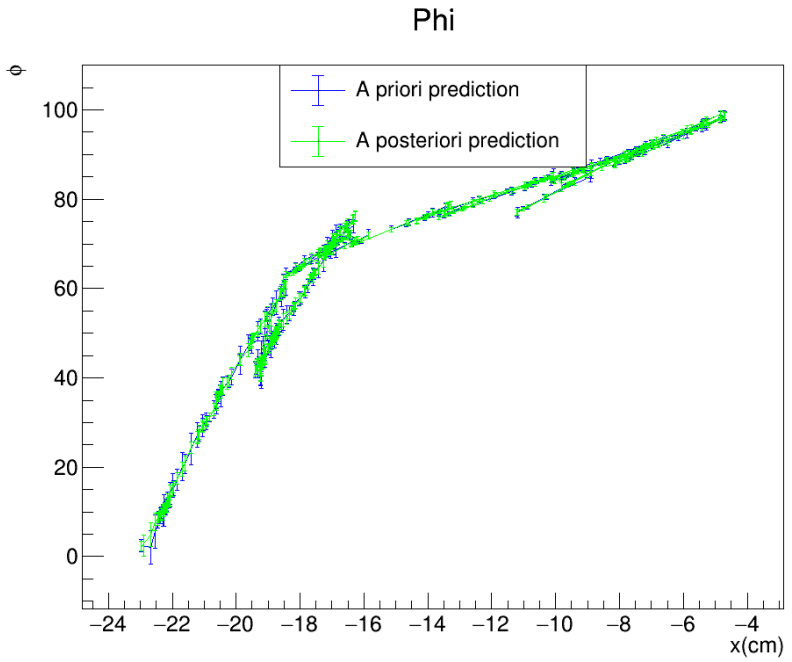
Gauss: $(\sigma^x_{Gauss}, \sigma^y_{Gauss}, \sigma^z_{Gauss}) = (0.04cm, 3cm, 3cm)$

FILTER PROPAGATION DIRECTION

TOY MONTE CARLO: SMEARED XYZ







KF™: $(\sigma_x, \sigma_{yz}) = (0.5cm, 1cm)$

Gauss: $(\sigma^x_{Gauss}, \sigma^y_{Gauss}, \sigma^z_{Gauss}) = (0.04cm, 3cm, 3cm)$

FILTER PROPAGATION DIRECTION