Commissioning of cooling channel optics

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Requirements

- Beam line elements

- Magnets

- TOF0, TOF1

- Trackers

Orbit assessment

check if
- means of transverse position ≈ 0,
- divergence ≈ 0

Optics assessment

check the beta function values at all 10 tracker planes

➡️ Transfer matrix through the channel can be measured and compared with simulations

JB Lagrange - CM41 - Feb 15

Simulations

Need also to determine the sensitivity of measurements to misalignments in magnetic field and detectors

Plans

- AFC translations
- AFC rotations
- SSD translations
- SSD rotations
- AFC & SSD translations
- AFC & SSD rotations

Each simulation will have 3 deviation magnitudes, each with 100 simulations at a gaussian distribution of deviations.

The Script   (C. Hunt)

This is made and very nearly tested.

- Selects track points randomly for each track so that each plane contains data from a completely unique set of tracks so we avoid measurement bias.

- Using reconstruction data only - no knowledge of Monte Carlo.

- Calculates emittances, beta functions, position and momentum means and spread.

- Can compare different geoemtries to see what happens to our measurement variables.

Still need to implement the reverse calculation. I.e. Can we deduce what causes our shift in emittance/beta function?

DISCLAIMER (C. Hunt)

No significant data sets have been produced owing to a recently discovered bug in the simulation software.

(Approx 3 Days ago. . .)

The running scripts are implemented and tested.

The analysis is nearly finished and well tested.

As soon as the bug is fixed we can flood the Imperial Batch System and produce our datasets. Approx 1 week.
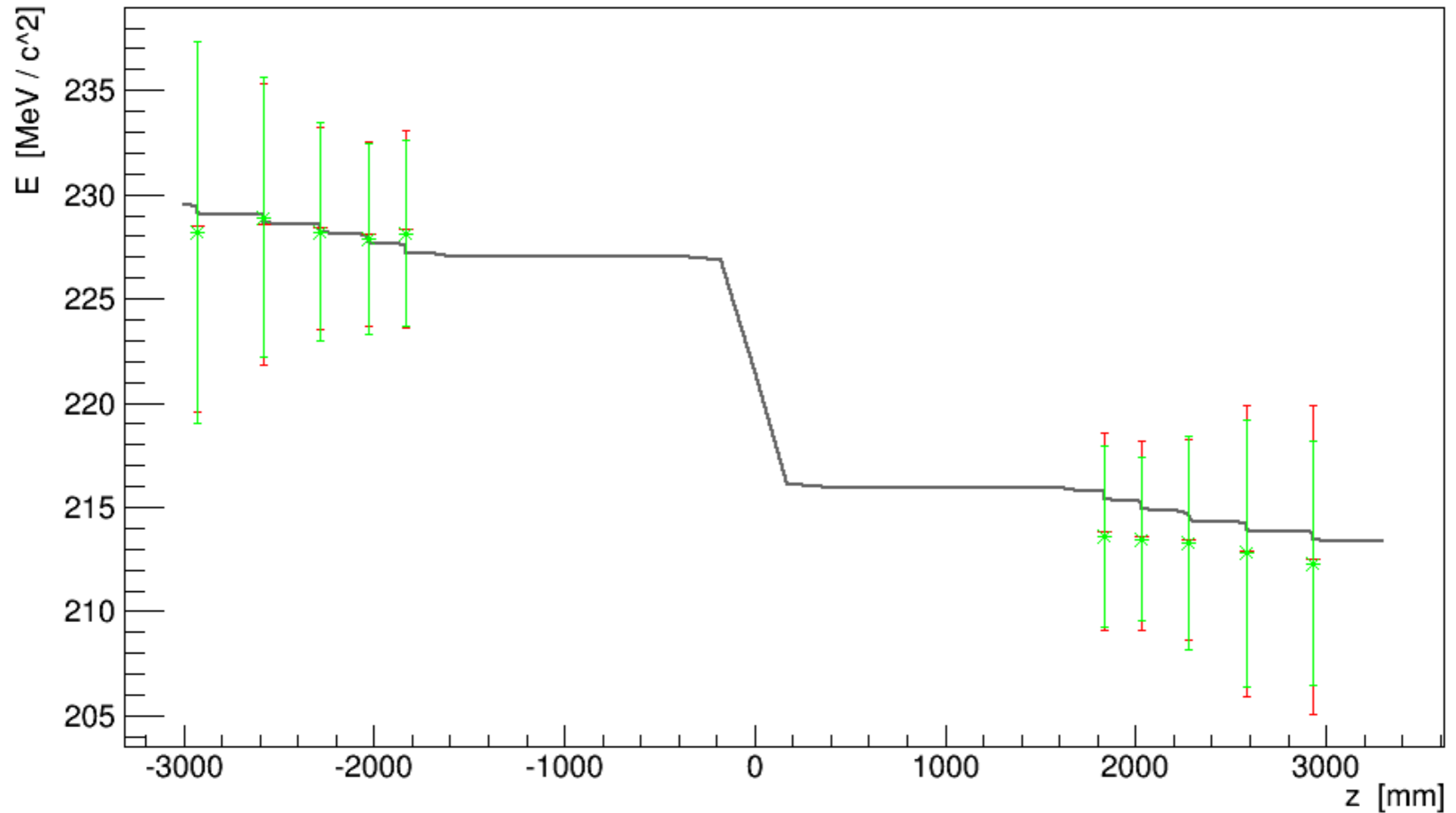
Example Data Set (C. Hunt)

Only have one simple data set as an example:

- AFC Rotation about X-axis by 5 Degrees (!!)

- Compared with Virtual Planes Reconstruction and the Base Reconstruction (no rotation)

- **RED** points are from the unrotated simulation

- **GREEN** points are from the rotated simulation

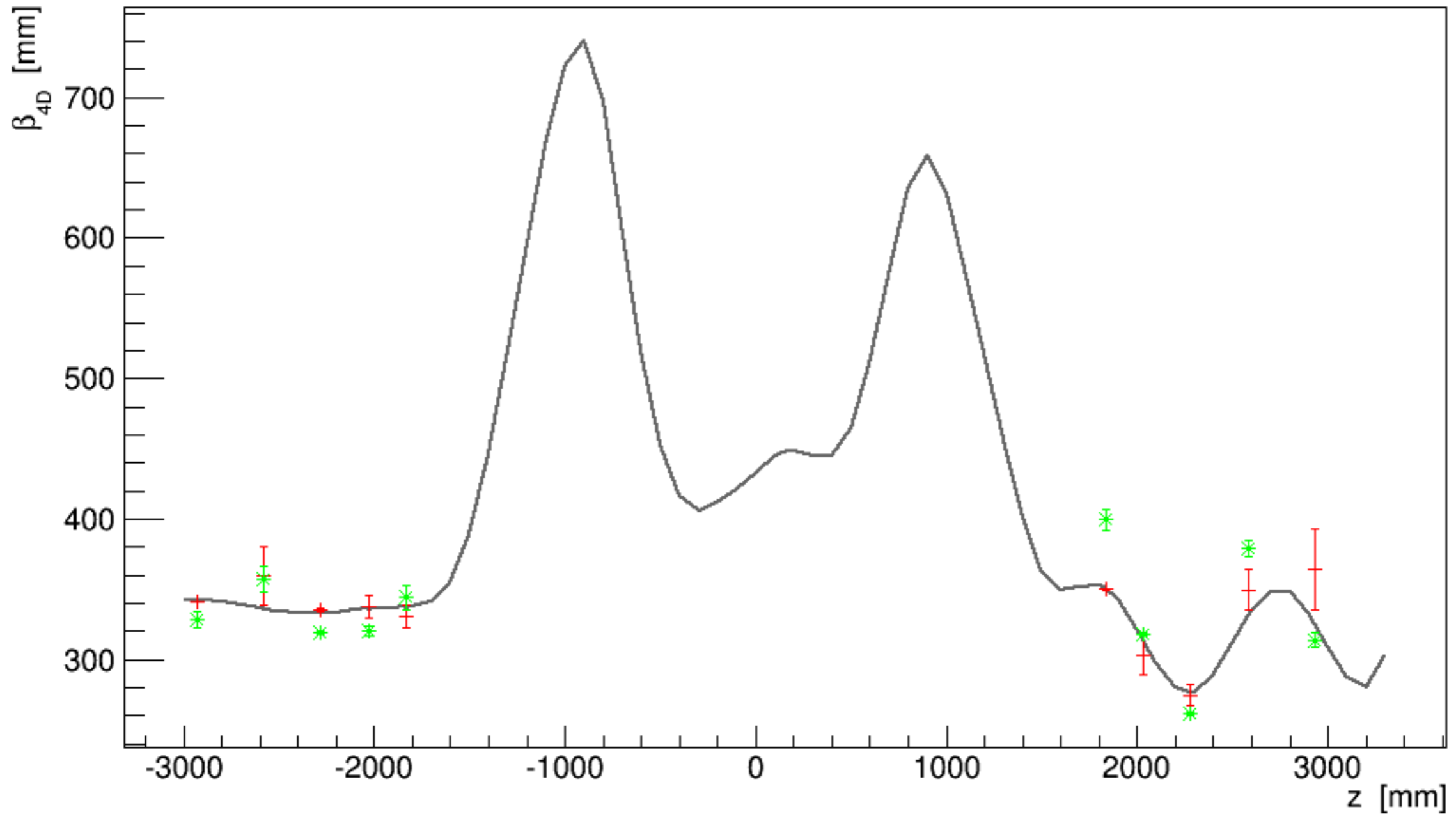Composed of approx 15000 muons for each dataset.
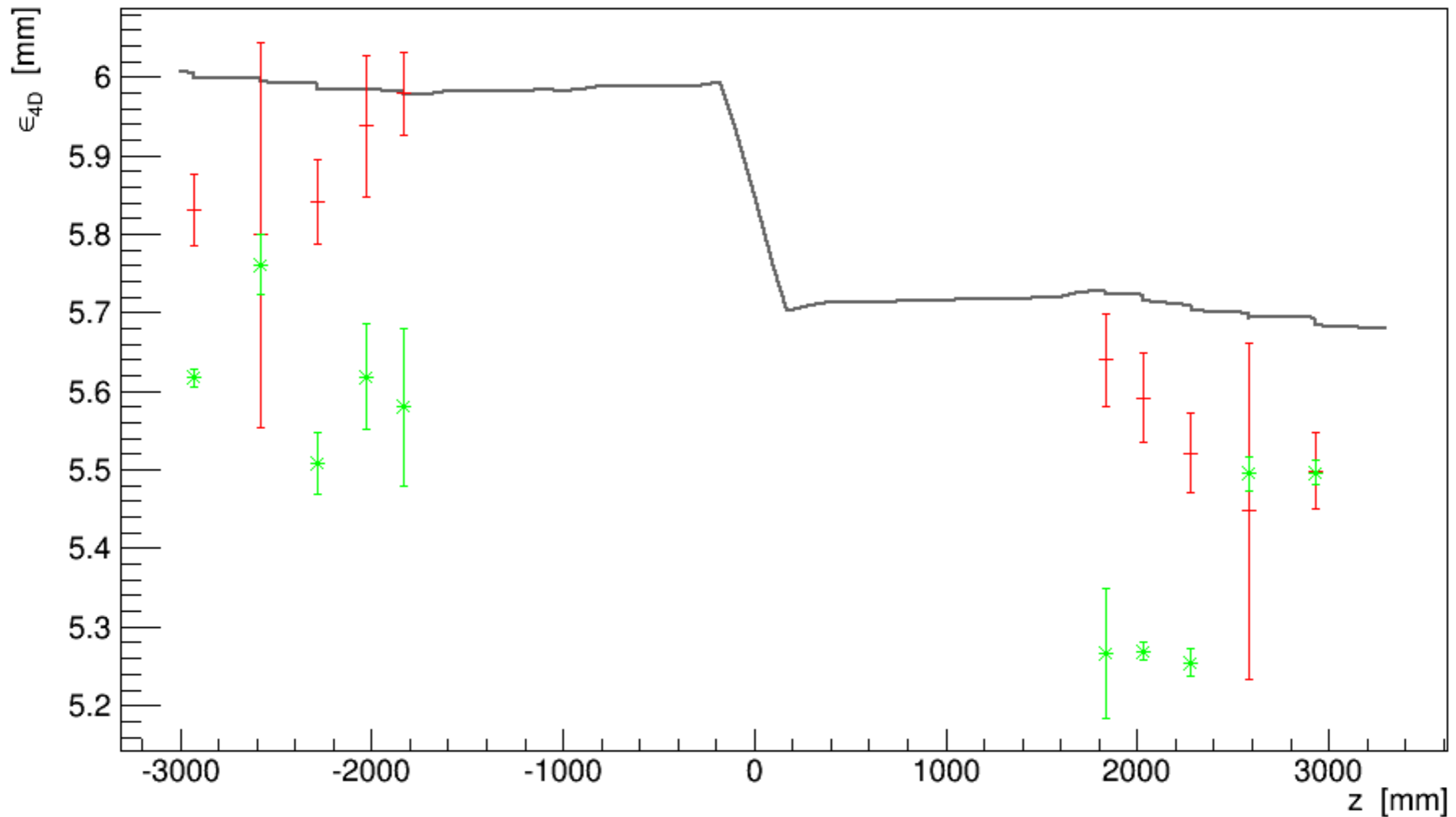
Energy

(C. Hunt)

Preliminary

Beta functions (C. Hunt)

Preliminary

Emittance

(C. Hunt)

Preliminary