Luminosity Pair Spectrometer Study

Studying Position Resolution for the LumiPS Calorimeter

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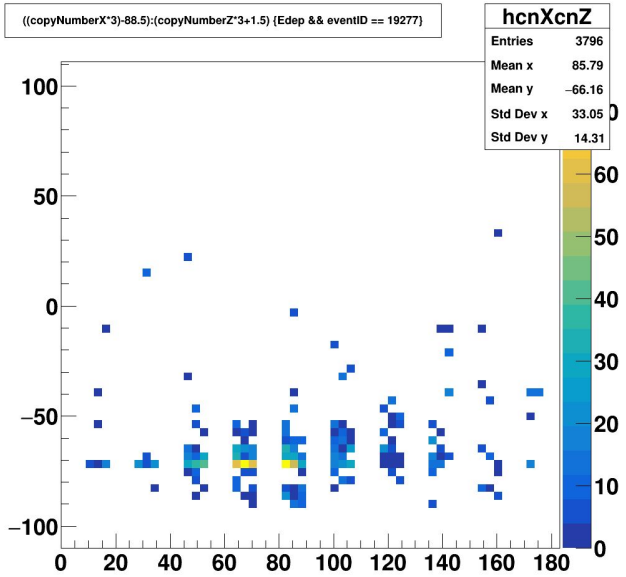
Method

- Use x or y position, and z position for each hit to reconstruct beam position.
- Beam has zero angle, but impacts at a random position on the calorimeter face.
- Use a chi-squared fit to determine angle and intercept of a line of best fit.
- These are directly linked to the beam position and angle.
- Beam energy was set at 8GeV

$$b_0 + b_i * Z = A \; where \; X, Y \in A$$

$$b_i = \frac{\overline{z * a} - \overline{z} * \overline{a}}{\overline{z^2} - \overline{z}^2}$$

$$b_0 = \overline{a} - b_i * \overline{z}$$

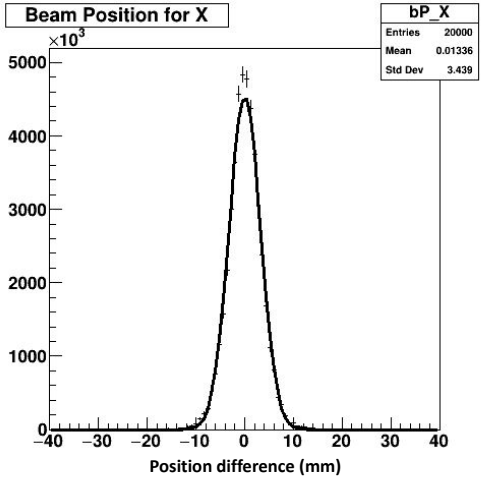


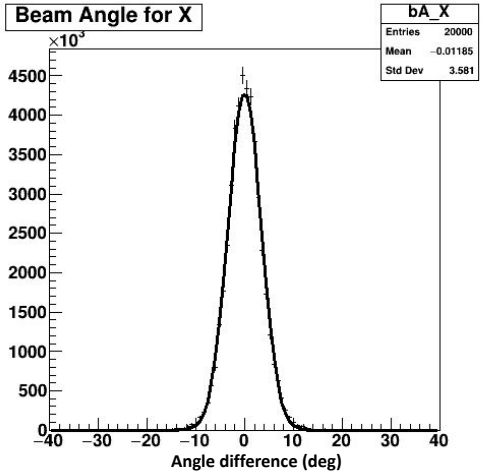
Readout view of calorimeter.

Beam X

- Fitting the histogram with a gaussian produced a mean of 0.0286mm and a standard deviation of 3.28mm.

- Fitting the histogram produced a mean of -0.0114° and a standard deviation of 3.46°.



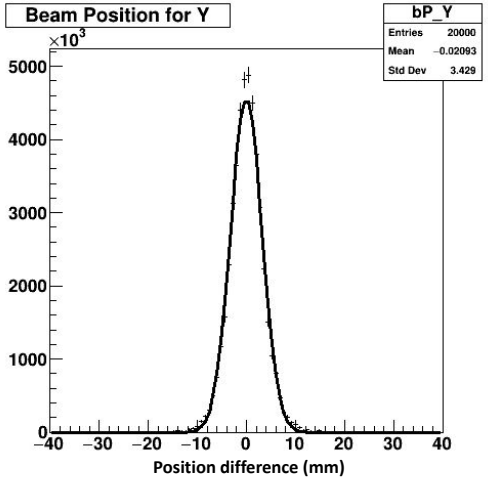


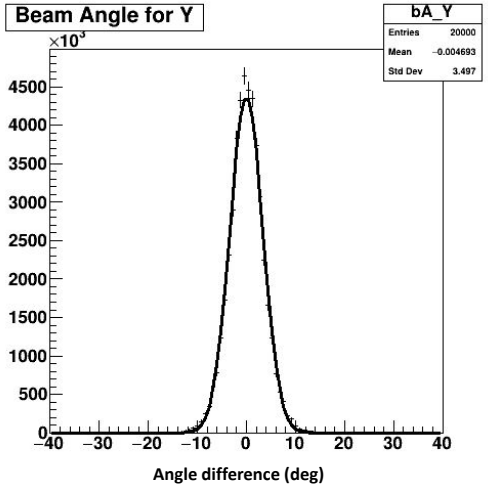
Difference between true beam property and reconstructed

Beam Y

- Fitting the histogram produced a mean of -0.0223mm and a standard deviation of 3.25mm.

- Fitting the histogram produced a mean of -0.0192° and a standard deviation of 3.40°.





Difference between true beam property and reconstructed

Next steps

- Simulate beam with realistic angle and position.