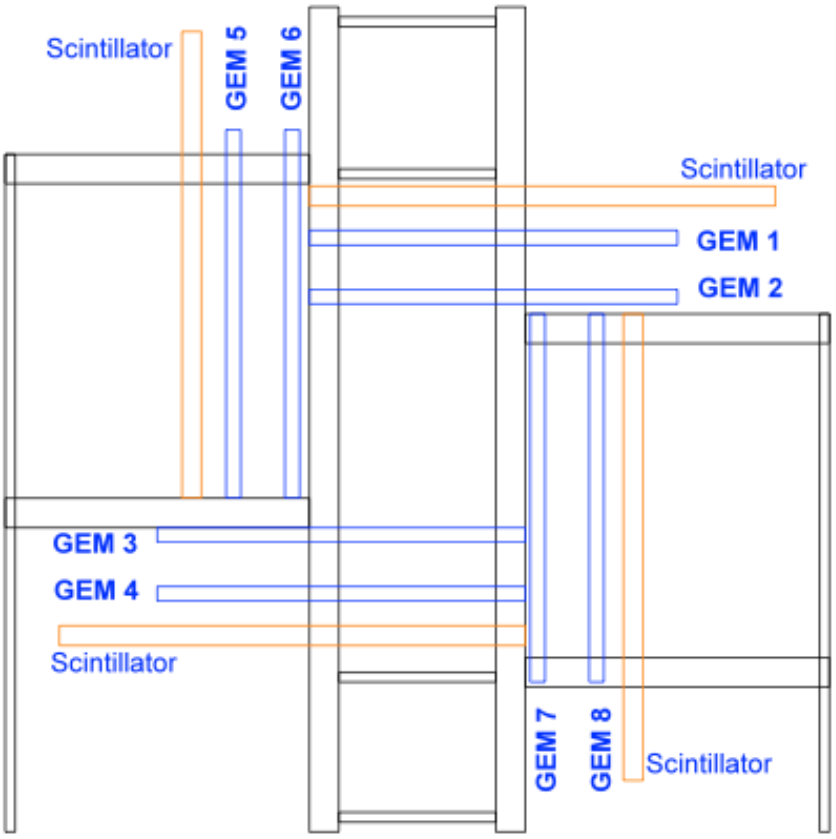
I have created a scale autocad drawing of the MTS and the station detectors. I am currently labeling the GEM detector drawings with the FEC mapping for the APVs.



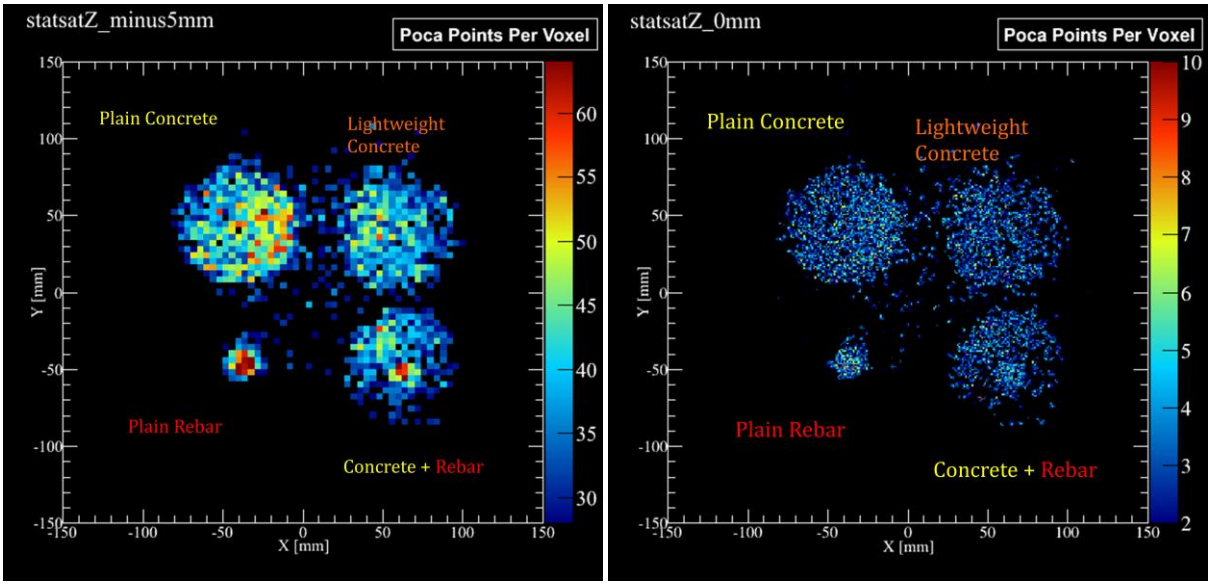
GEM 1:
FEC 1 ch 0 - 11
GEM 2:
FEC 1 ch 12 - 15
FEC 2 ch 0 - 7
GEM 3:
FEC 2 ch 8 - 15
FEC 3 ch 0 - 3
GEM 4:
FEC 3 ch 4 - 15

GEM 5:
FEC 4 ch 0 - 11
GEM 6:
FEC 4 ch 12 - 15
FEC 5 ch 0 - 7
GEM 7:
FEC 5 ch 8 - 15
FEC 6 ch 0 - 3
GEM 8:
FEC 6 ch 4 - 15

To build upon the results of last semester's scenario with upright concrete cylinders, a new scenario using upright cylinders and corroded rebar is currently in the MTS. The corroded concrete scenario includes two concrete cylinders with rebar, one un-corroded and one with artificially accelerated corrosion, and two pieces of raw rebar, one un-corroded and one corroded. A plain concrete cylinder was also included as a reference to compare to previous scenarios.

Midway through the semester the FECs and Amore plots began to show anomalous data, including large empty sections on the hit maps of GEMs seven and eight. Although the empty sections line up with the APV sectors, the APVs appear to still be in proper, working condition and Christian and I have been unable to determine where in the system the fault originates.

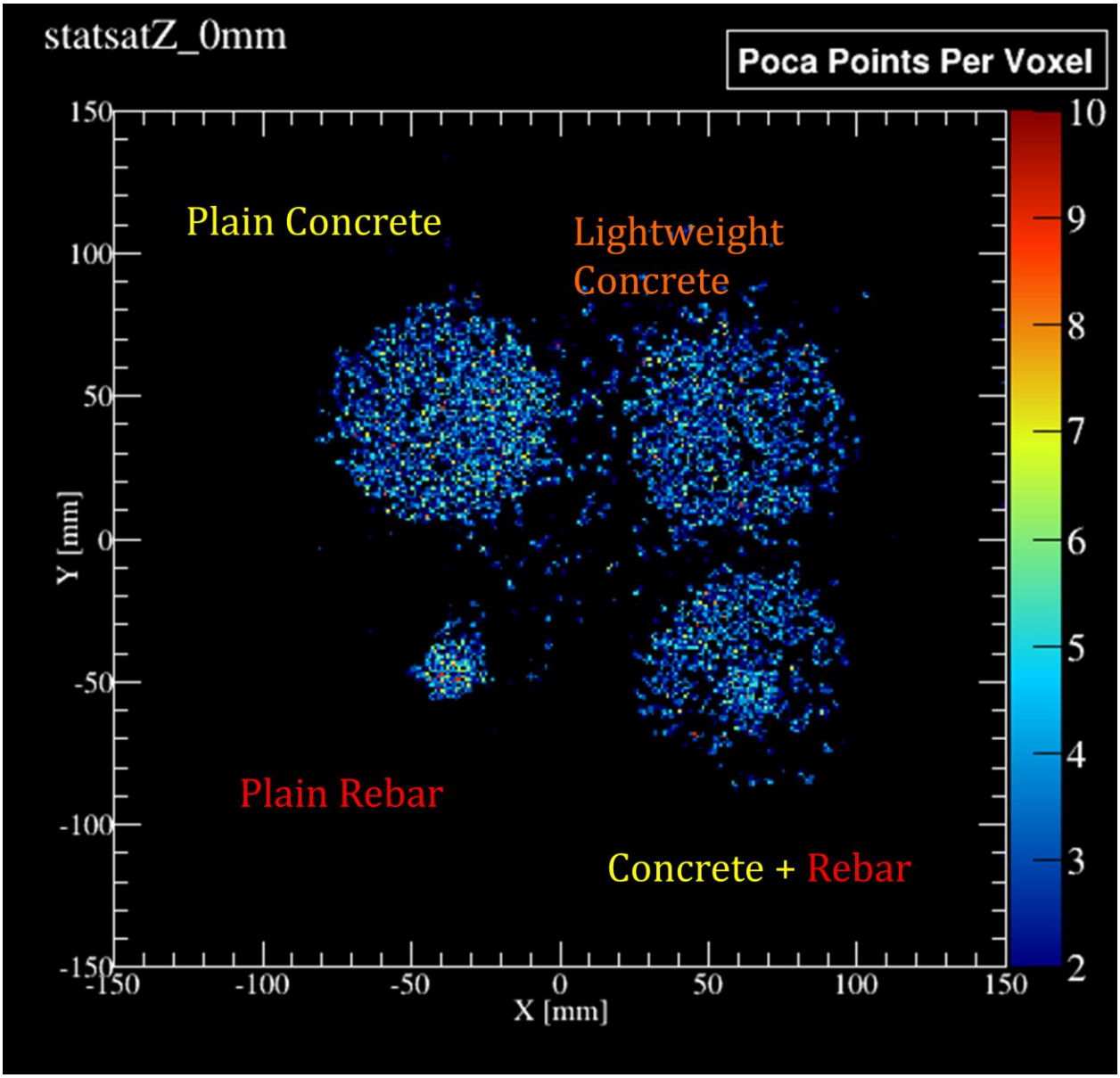
I continued the data analysis on the upright concrete scenario from fall 2013 and found that selection of a smaller voxel resulted in a clearer plot. While a smaller voxel size logically would provide higher resolution, prior scenarios have not had sufficient statistics



for reliable results at this scale. Working with the upright concrete and center 1 cm lead scenarios, I experimented how the poca plots vary with deflection angle. Currently the default is to include points with deflection angles between two and ninety degrees in the ploca plots. It is my purpose to see if it is possible to improve the resolution of object boundaries by selecting smaller ranges of angles. It is also my hope that by comparing the statistics for different angles, it will be possible to identify and correct for the ghosting

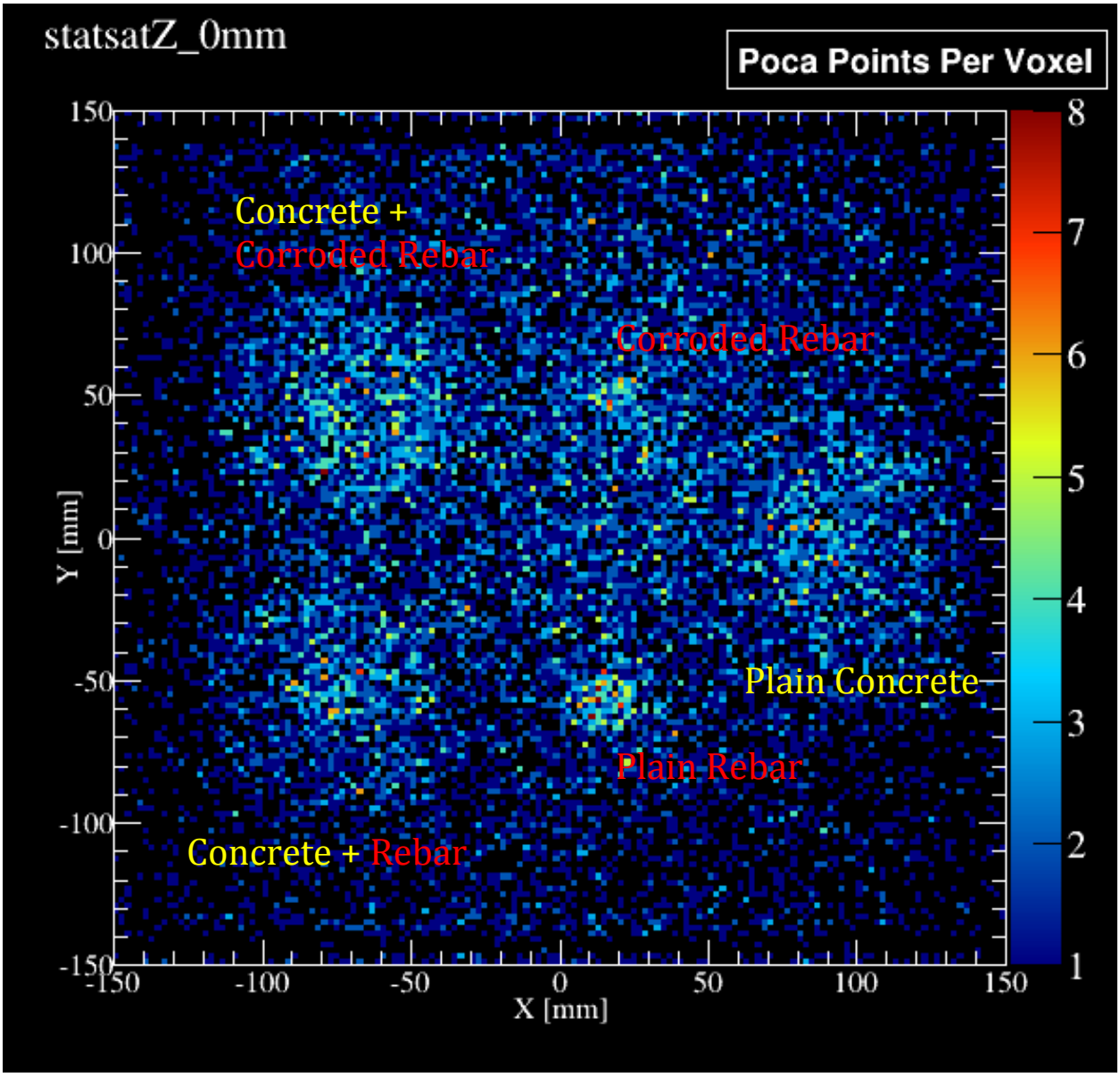
below objects and the high angle deflections near the detectors that result from the reconstruction procedure.

I have begun familiarizing myself with the functions of ROOT and am working on writing code to generate additional poca plots. The priority is currently implementation of scattering density plots (scattering angle vs. number of poca points for a selected volume), which can be used to compare the results from the three concrete scenarios. In addition to comparing the scattering density profiles for concrete and rebar, it will be possible to determine how the scattering profile for the same material varies between scenarios. I am also beginning work on code that, given X, Z (or Y, Z) coordinates, plots the number of poca points as a function of Y (or X) and scattering angle. The purpose of the plot is to identify which scattering angles exhibit the greatest change in statistics across material boundaries.



Stats: 120 mm XY slice @ Z = -5 mm; Muon Cut 2, NMC 8

This is the XY stats plot for the upright concrete scenario. The plot is based off of 1,071,889 reconstructed events. The outlines of the concrete and rebar are clearly defined and there is some, but not excessive, noise. Additional plots and discussion of this scenario are available in last semester's research report.



Stats: 120 mm XY slice @ Z = -5 mm; Muon Cut 1, NMC 0

This is the XY stats plot for the corroded concrete scenario. The plot is based off of a partial data set of 217,179 reconstructed events. The outlines of the rebar are visible, and, while not especially clear, the concrete is still distinguishable. The Concrete surrounding the corroded rebar is showing higher statistics than the plain concrete with rebar; it may have absorbed some of the iron from the water corroding it, although higher statistics are needed to determine what effect this will have.