

# Emulsion Reconstruction at SND@LHC

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## Abstract

Emulsion data analysis at the Scattering Neutrino Detector involves a process starting with raw data and ending with 3D presentation. This report focuses on the reconstruction step within this process, which will lead way to linking, merging, alignment, tracking, vertexing, then analysis. Hence, this report briefly summarizes results of emulsion reconstruction of two datasets from Run 1 Brick 143 and Run 2 Brick 23 after an update of the FEDRA compilation and implementing the mosaic step to the reconstruction process. Many plates appear to have had processing errors, where the mosaic plots exhibit grid-like features.

## 1 Run 1 Brick 143

For plates 1-14, side 1 appears normal with some variety in quality of reconstruction, while side 2 show abnormal horizontal lines of gaps from the process. For example, the mosaic plots of plate 1 are shown below in Figure 1.

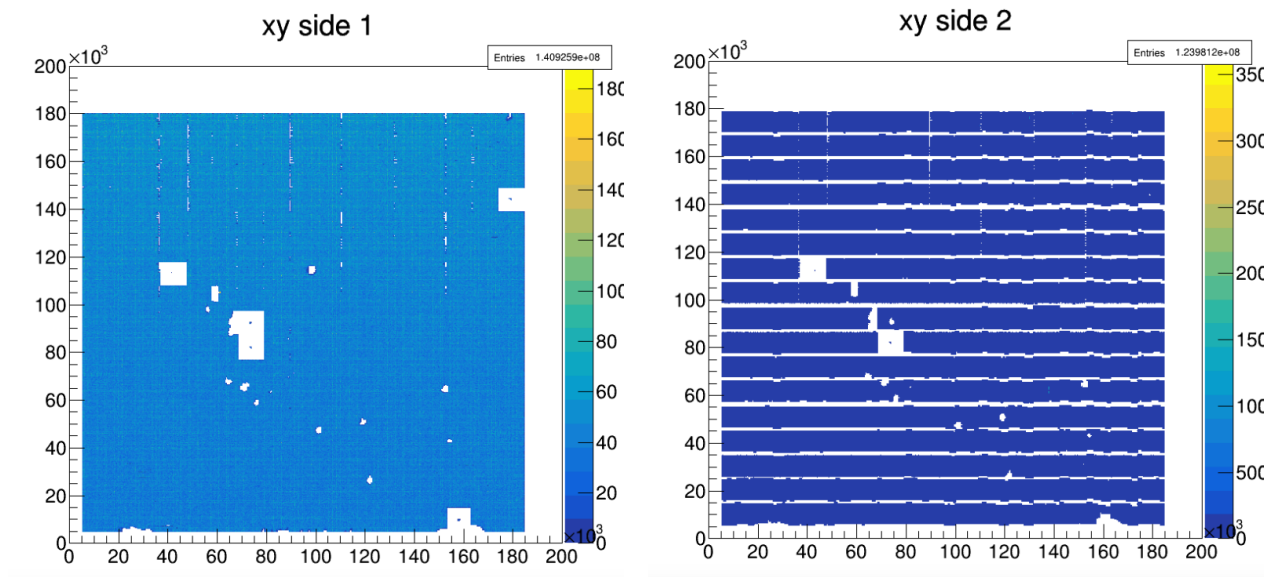


Figure 1: Plate 1 mosaic plots from Run 1 Brick 143.

The quality of the two sides can also be compared by considering the distribution plots shown in Figures 2 and 3. In the last distribution plot of each figure, one can observe a clear difference in the quality. Whereas side 1 shows a clear unimodality centered at 0, side 2 does not show such unimodality. This problem is consistent across the first 14 plates.

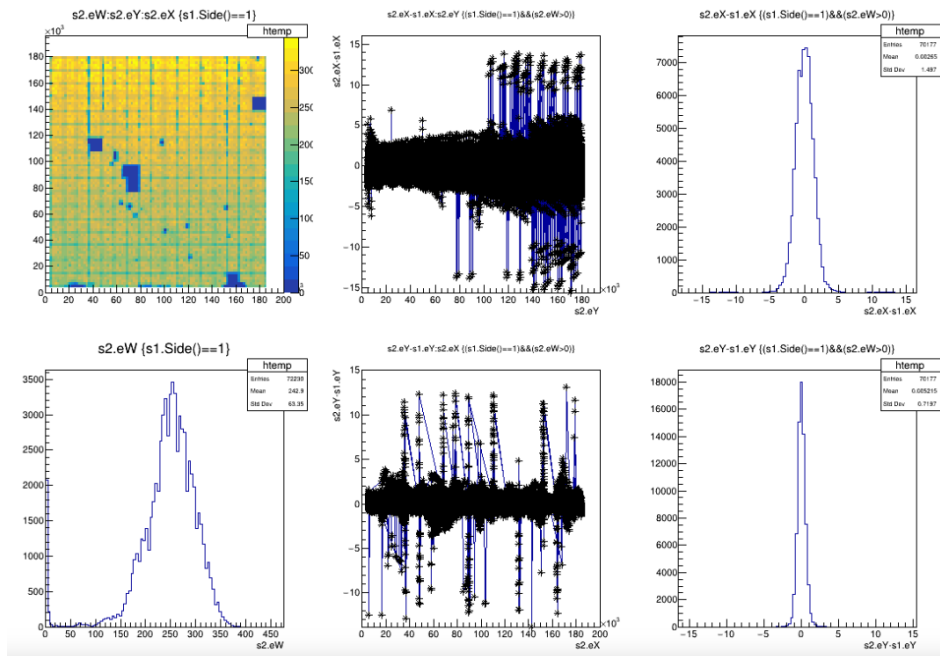


Figure 2: Side 1 of plate 1 distribution plots from Run 1 Brick 143.

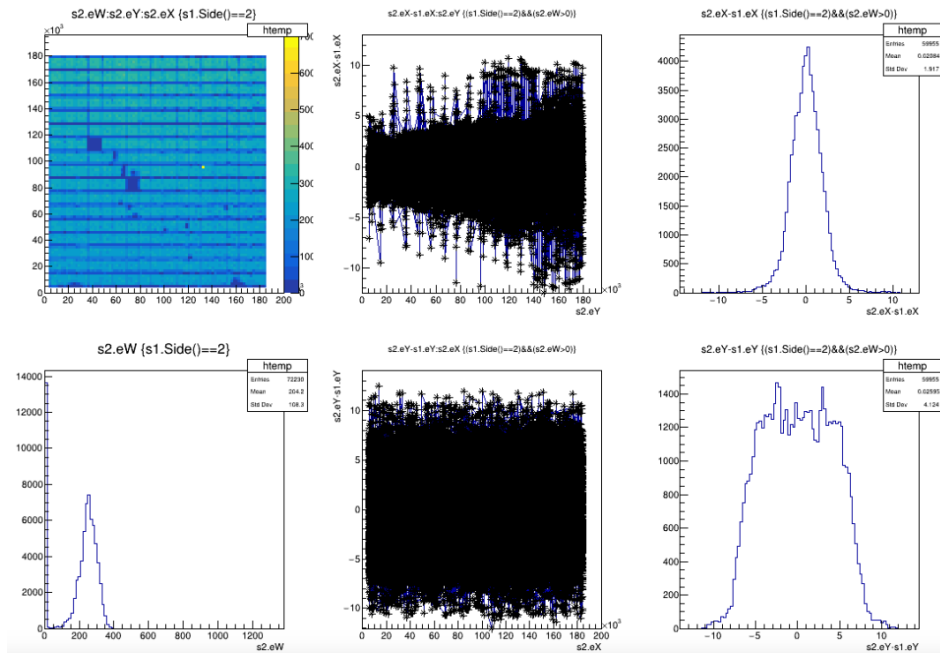


Figure 3: Side 2 of plate 1 distribution plots from Run 1 Brick 143.

Plates 15-44 appear normal, with varying qualities of reconstruction. For a comparison against plate 1, a good example would be plate 20, as shown in Figure 4.

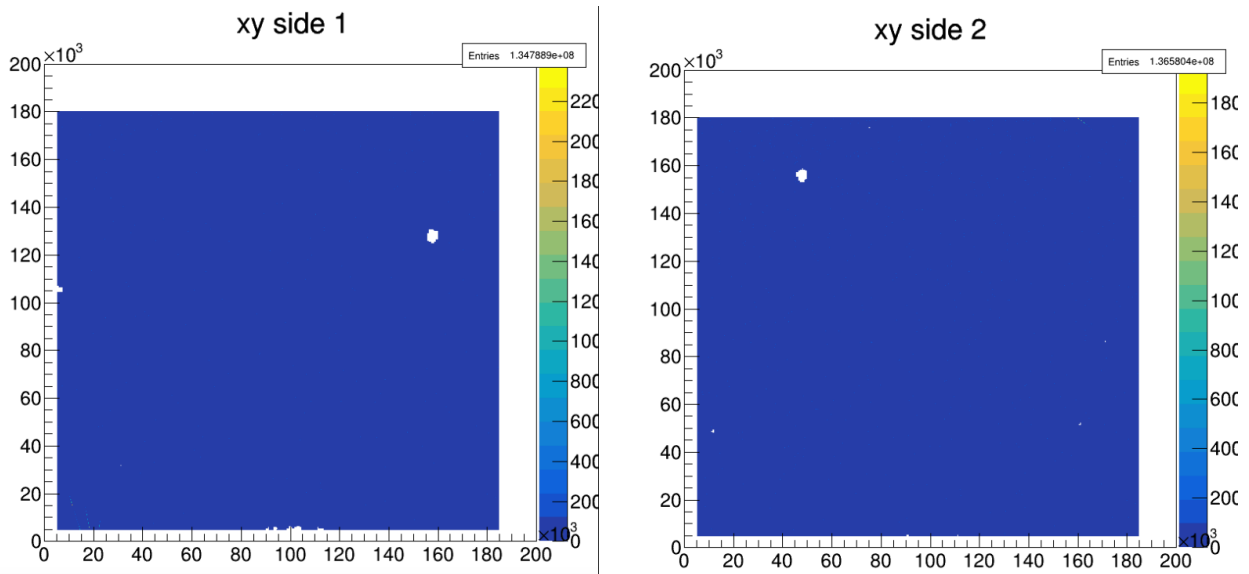


Figure 4: Plate 20 mosaic plots from Run 1 Brick 143.

Plates 45-57 show issues on both sides of each plate, appearing grid-like in the mosaic plots, as shown in Figure 5. In this case, we can see in the distribution plots in Figure 6 that there are multiple extra peaks on either side of the center.

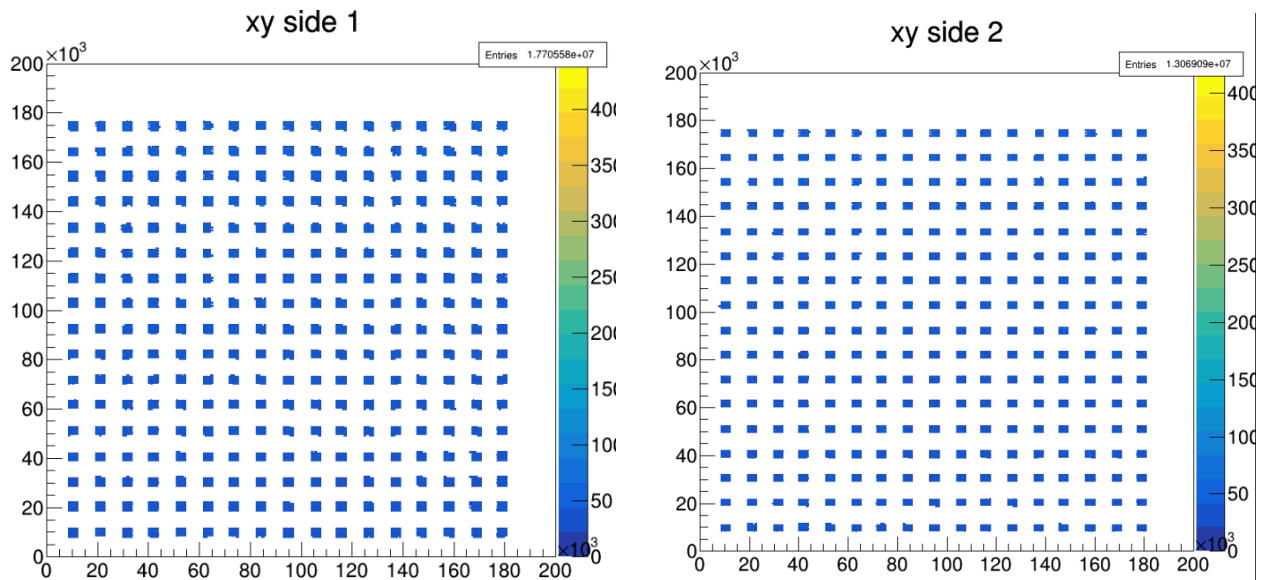


Figure 5: Plate 45 mosaic plots from Run 1 Brick 143.

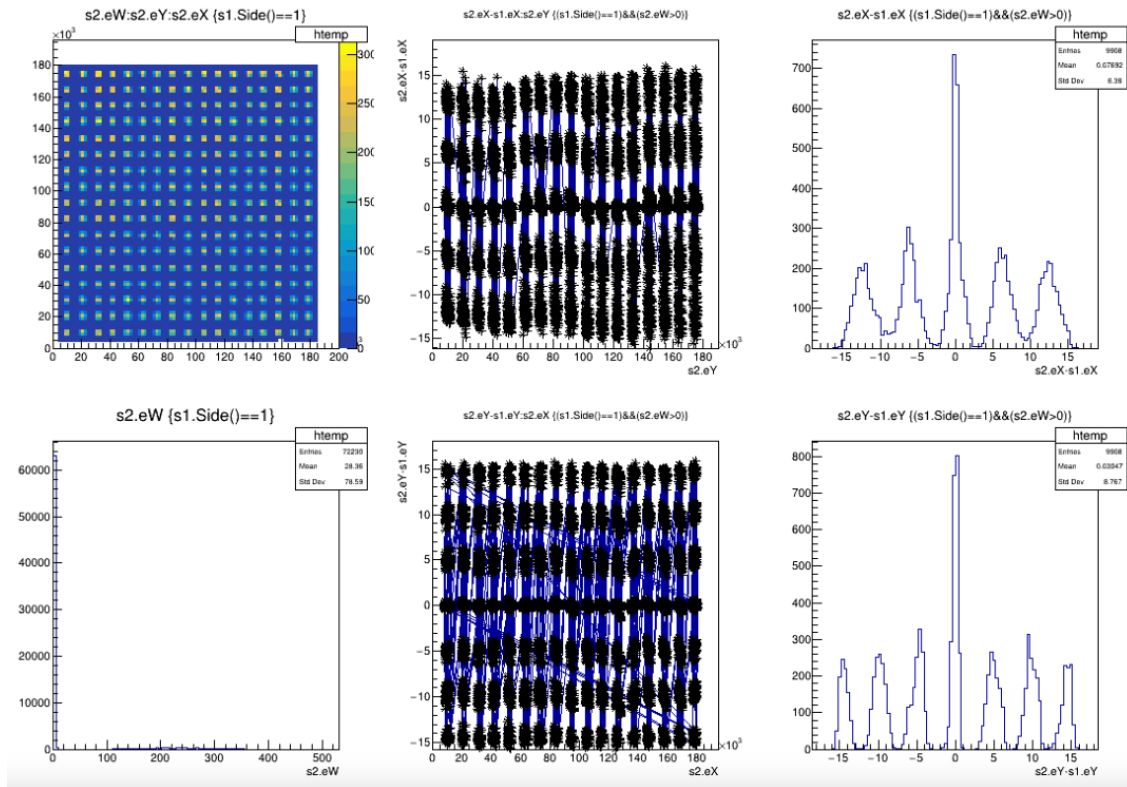


Figure 6: Plate 45 distribution plots from Run 1 Brick 143.

Additionally, plate 49 failed to process. These problems are currently being investigated and resolved.

## 2 Run 2 Brick 23

Mosaic and distribution plots for this dataset are still in the process of being constructed, with an oddly long run-time likely due to the skill issues of the intern writing this report. However, distribution plots for both sides of plate 1 were successfully retrieved and shown in Figures 7 and 8. It is interesting to note the bimodality of the top right distribution plots on each side.

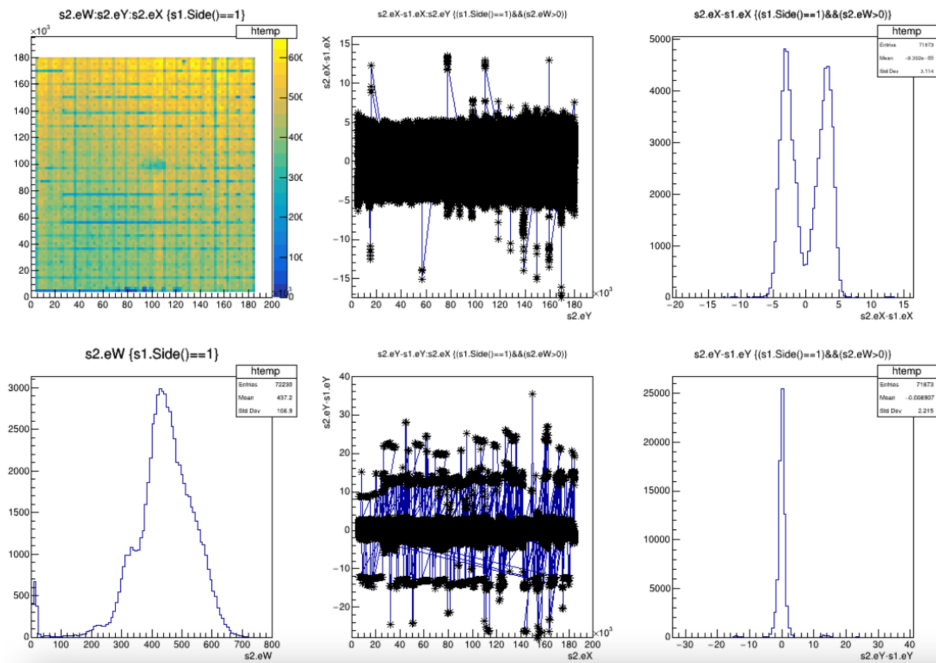


Figure 7: Side 1 of plate 1 distribution plots from Run 2 Brick 23.

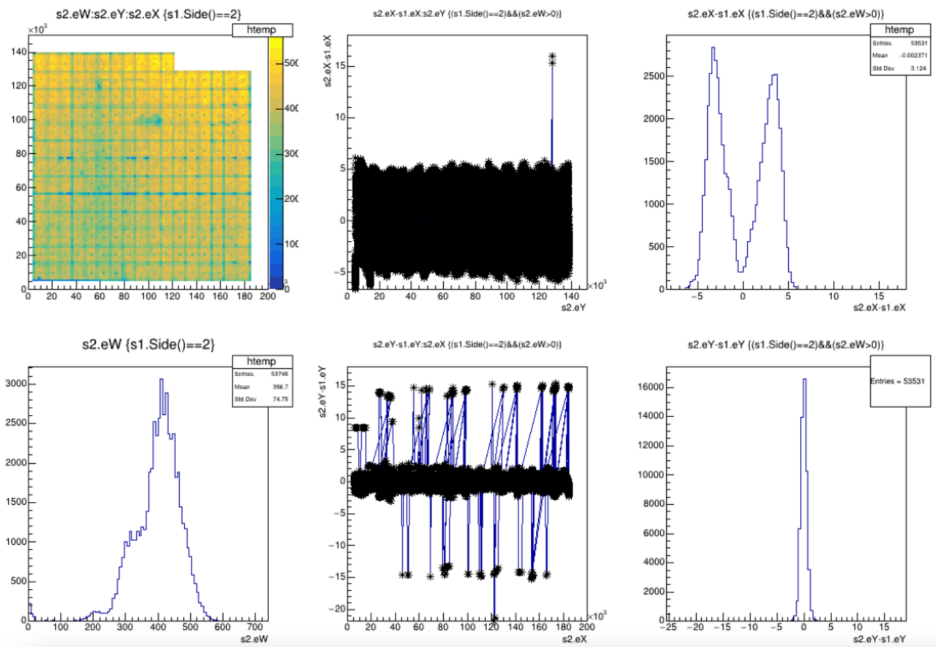


Figure 8: Side 2 of plate 1 distribution plots from Run 2 Brick 23.

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