sPHENIX | Report

Updated Channel Mapping in Multiple TPC Au+Au Event Displays and Animations

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Modifications to Original Displays

This note is to record changes made to previously approved figures that more correctly depict the accurate position mapping of the recorded hits from TPC run 10931 event displays. Shown below in each figure is the original approved figure next to the updated, improved new figure in order to highlight the improvement in hit mapping that will hopefully improve clustering performance and track reconstruction in the TPC.

The major changes between the original displays and the new ones involve a reflection of the phi position when dealing with hits on the north versus the south end of the TPC and a correction to the originally erroneous FEE mapping within each sector. For the reflection of the phi position, sectors 0-11 were changed to have the phi value produced by the TPCMap module made negative before adding the overall phase shift for the given sector position, while sectors 12-23 remained with their original positive valued TPCMap phi value. For the correction of the FEE mapping, Tom Hemmick was able to determine the original mapping of the overall FEE number to the number specific to the ordering withing a radial segment was incorrect, and this updated mapping can be seen in both the TPCRawDataTree module and the updated TPCEventDisplay macro.

In addition, the original cut on hits being at least 4 sigma and at least 10 ADC counts above the pedestal mean was increased to 5 sigma after increased noise was observed in the TPC. This has not affected the number of tracks observed or hits significantly and is only a minor change considering 1 sigma is approximately 2 ADC counts anyways.
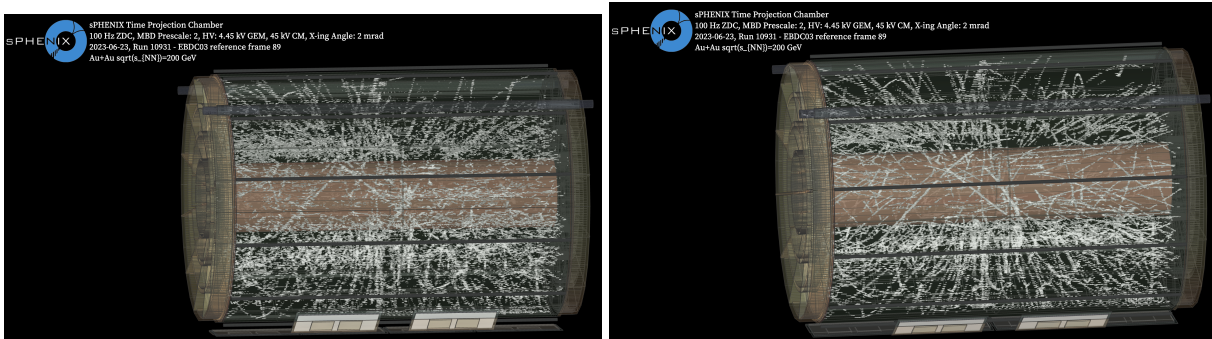
All other details of how the events were reconstructed are consistent with the previously approved note which may be found here.
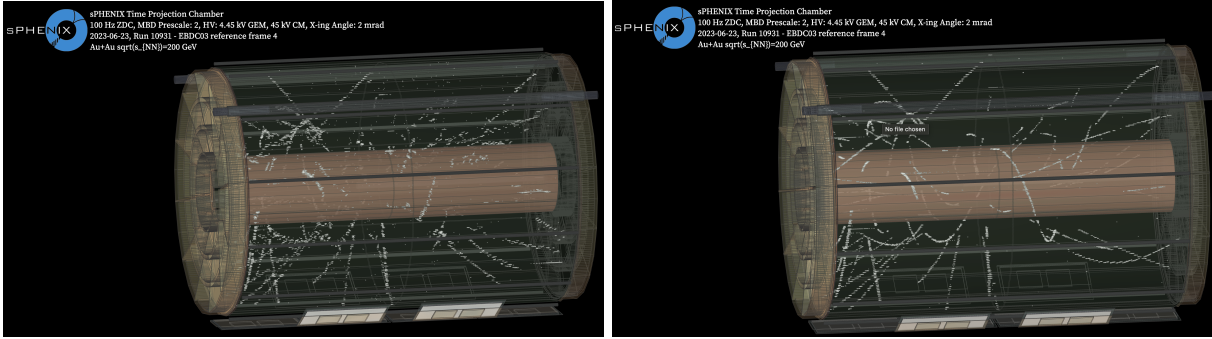
Figure 1: TPC single event display using EBDC03 frame 4 as the reference frame. New display on the right, old on the left (will be the same for all other figures).
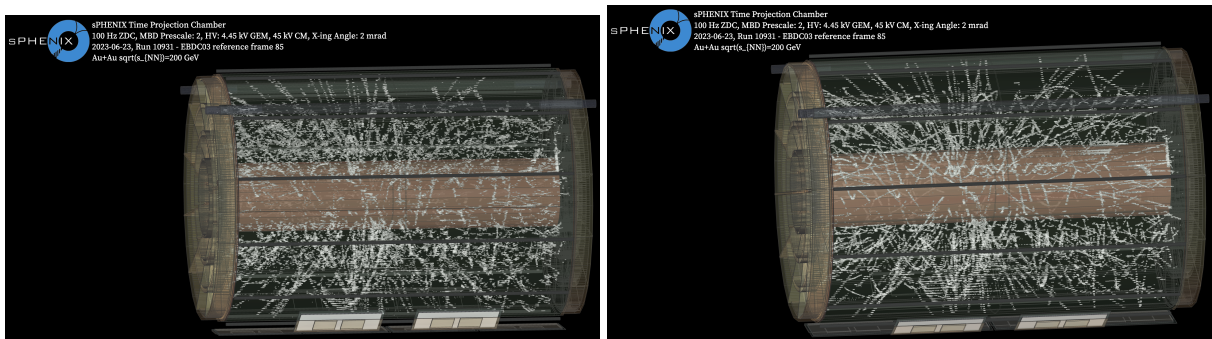
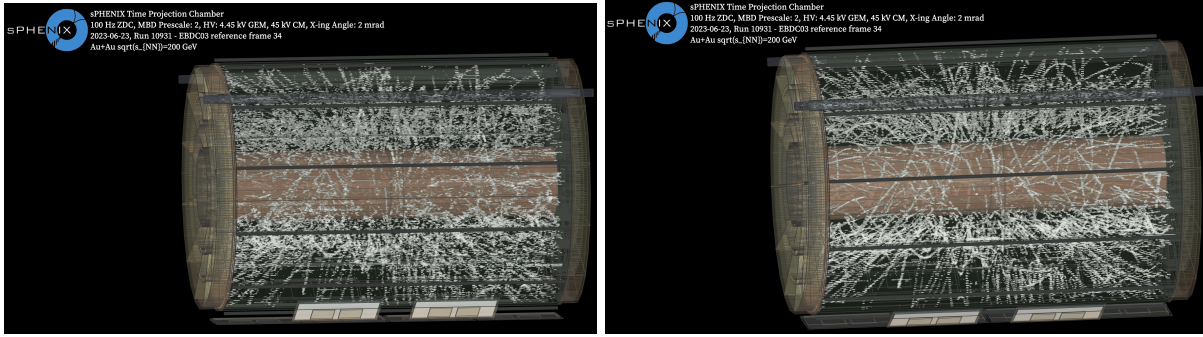**Figure 2:** TPC single event display using EBDC03 frame 85 as the reference frame.

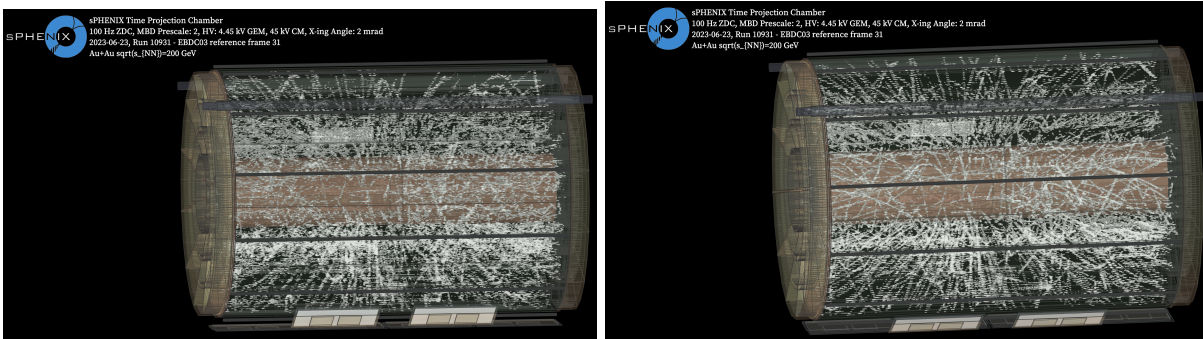**Figure 3:** TPC single event display using EBDC03 frame 89 as the reference frame.

Data Used

More information on the data taken during this run can also be found at this wiki page.

Figures 1-6:

```
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/sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc01_beam-00010931-0000.prdf
/sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc02_beam-00010931-0000.prdf
/sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc03_beam-00010931-0000.prdf
```

Figure 4: TPC single event display using EBDC03 frame 34 as the reference frame.

Figure 5: TPC single event display using EBDC03 frame 31 as the reference frame.

Figure 6: TPC single event display using EBDC03 frame 43 as the reference frame.

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33  /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc04_beam-00010931-0000.prdf
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42  /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc13_beam-00010931-0000.prdf
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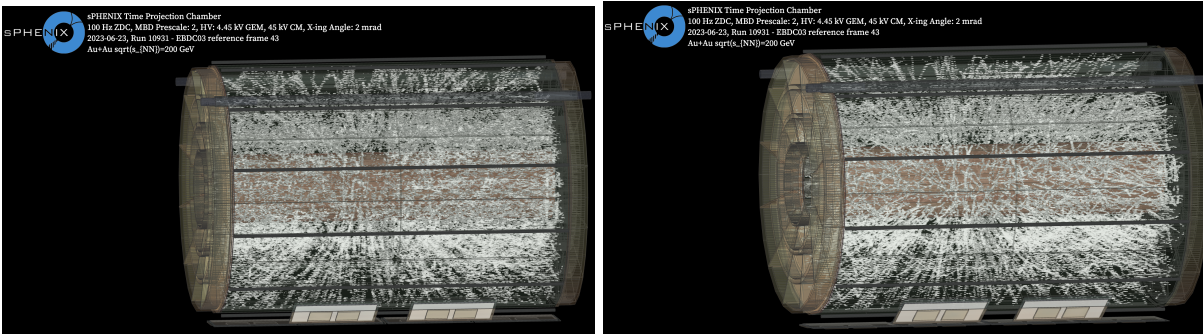
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43    /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc14_beam-00010931-0000.prdf
44    /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc15_beam-00010931-0000.prdf
45    /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc16_beam-00010931-0000.prdf
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51    /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc22_beam-00010931-0000.prdf
52    /sphenix/lustre01/sphnxpro/commissioning/tpc/beam/TPC_ebdc23_beam-00010931-0000.prdf
```

53 All sector frame values used for each image:

EBDC	Figure 6	Figure 4	Figure 2	Figure 3	Figure 1	Figure 5
00	38	28	80	84	4	26
01	48	38	87	91	4	36
02	37	35	83	89	6	33
03	43	34	85	89	4	31
04	37	27	75	79	4	25
05	52	40	93	97	4	38
06	64	51	76	76	6	47
07	50	38	91	97	6	34
08	44	36	83	87	4	33
09	41	33	81	85	4	31
10	39	30	75	79	4	28
11	40	32	74	74	4	30
12	47	37	92	96	4	34
13	40	32	74	80	4	30
14	47	36	91	97	4	N/A
15	43	33	84	90	5	31
16	41	31	77	83	5	29
17	46	36	80	86	5	34
18	39	31	85	90	4	29
19	48	38	85	90	4	36
20	42	34	82	86	6	32
21	42	34	82	86	4	32
22	50	38	93	97	4	34
23	44	34	86	90	4	32

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