

Mapping for a Cylindrical Micro-Resistive Well Detector

1. Group Members:

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2. Faculty Advisors:

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3. Clients:

Pietro Iapozzuto- Physics department

Dr. Marcus Hohlmann- Physics department

4. Milestone 5 Task Progress Matrix:

Task	Completion	Alejandro	Summer	TO DO
I. Apply clustering and iterative offset shift before reconstructing	95%	50%	45%	Iterative shifting to account for the offset
II. Automate beam reconstruction pipeline for multiple root files	50%	40%	10%	Test automation script
III. Do efficiency plots and other requested graphs for analysis	80	40%	40%	Need comparison plot for det5 residuals

5. Discussion of task progress for M4

I. Apply clustering and iterative offset shift before reconstructing

The clustering algorithm was applied to both the tracker data and the cylindrical data.

Dynamic thresholding was also applied to both the tracker data and the cylindrical data.

The offset shift has yet to be applied because the tracker residual results were not satisfactory and moving forward with bad data would have caused more issues down the line. Instead, more preprocessing was applied to help improve results including considering events with multiple clusters per tracker, or events with a bad tracker removed.

II. Automate beam reconstruction pipeline for multiple root files

We wrote a script for automating the root file generation for multiple raw captures but are still testing before it's sent on a 10 hour execution so it doesn't break midway through without anyone noticing. However, we did begin to test manually on other root files and analyze results.

III. Do efficiency plots and other requested graphs for analysis

We created an additional tracker residual plot that compares against adc values to sanity check the dynamic thresholding step. We also generated total cluster adc plots with landau fit for the cylindrical detector. The strip multiplicity plot was also created for the detector 5 cluster data. More plots are still to come.

6. Discussion of team member contribution

Alejandro- Applied clustering algorithm on cylindrical data. Generated total cluster adc plots with landau fit for the cylindrical detector. Generated cluster strip multiplicity plots for the cylindrical detector. Started to build the automatization pipeline to handle multiple root files, and generate all required plots. Plots handled at this moment are dynamic threshold, uv split, beam reconstructions for all the trackers and cylindrical detector.

Summer- Applied clustering algorithm and dynamic thresholding on tracker (planar) data. Applied additional "golden data" filters to narrow the search down to four good events. Adapted the tracker trajectory algorithm to relax the data requirements (ex: including events with multiple clusters per tracker, or events with a bad tracker removed). Wrote script for automating root file generation

7. Milestone 6 Task Matrix

Task	Alejandro	Summer
I. Demo video	50%	50%
II. User manual	50%	50%
III. Automate pipeline for multiple root files	50%	50%

8. Discussion of tasks planned for M5

I. Demo video

We plan to create a user demo video to illustrate the uses, functionalities, and features of our tool. The demo will aid physicists in adding specific filters and other desired specifications or plot types.

II. User manual

We plan to create a user manual to explain the uses, functionalities, and features of our tool. The user manual will aid physicists in adding specific filters and other desired specifications or plot types. The user manual will also elaborate the reasoning behind the data analysis steps within the pipeline and expected results.

III. Automate pipeline for multiple root files

We plan to automate the pipeline for multiple root files so we can have a larger and more varied dataset. This is also important because different root files/runs may have different metadata that we can use to perform additional analysis and plots that wasn't previously possible with a single root file.

9-10. See faculty meetings and feedback below

11. Dates and Meetings with Faculty:

1. October 6th, 2026
2. October 9th, 2026
3. October 16th, 2026
4. October 19th, 2026
5. October 22nd, 2026
6. October 23rd, 2026
7. October 26th, 2026

12. Faculty feedback on tasks for M5

- show plots before 0 suppression
- do for four good events and four not good events
- pedestal with data for reconstruction
- stop the lambda fit around 1500, the long tail makes it look bad
- replot the strip multiplicity histogram so the bars are centered on the numbers
- straight strips the strip multiplicity increases
- show the strip multiplicity for 1 as well just for data sake
- either allow less trackers or multiple clusters per event per tracker
- get around 100 events says merrick
- hohlmann says few hundred to 1000
- look at more files, like maybe 10 at a time

13. Approval from Faculty Advisor

- "I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones."
- Signature: _____ Date: _____