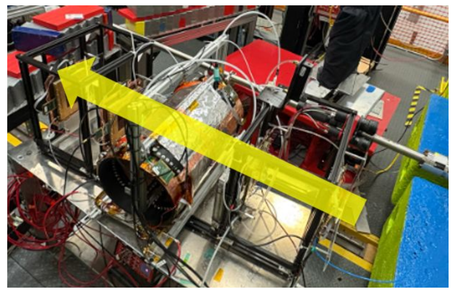
Mapping for a Cylindrical Micro-Resistive Well Detector

Team Members: Alejandro Moreno Zuluaga, Summer Mueller

Faculty Advisor: Dr. Marcus Hohlmann, Dept. of Aerospace Physics and Space Sciences, Florida Institute of Technology

Introduction

- The micro-resistive well detector detects clusters of electrons.
- Typical designs are planar (2d), this is the first cylindrical detector of its kind.



- Analog signal data from the detector must be processed and analyzed to reconstruct the position and trajectory of particles with great precision.

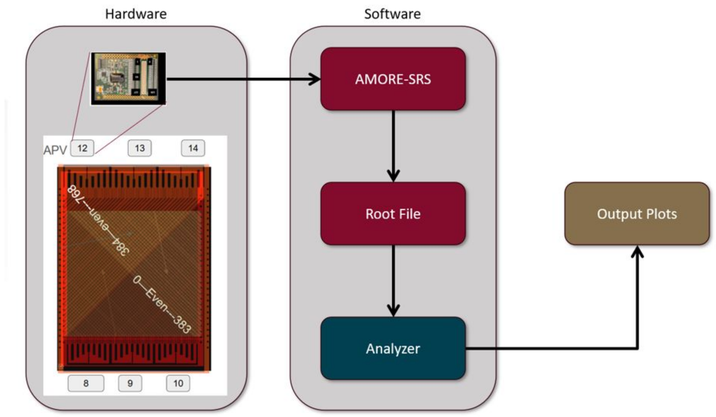
Motivation

The goal for the project is to create a program that characterizes the efficiency and resolution for the cylindrical micro resistive well detector. The motivation for the project is to provide support for the software integration so the data can be more easily visualized and analyzed by the physicists.

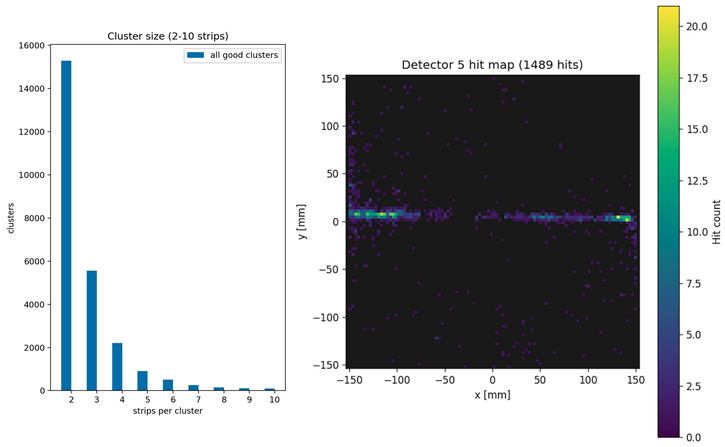
Methodology

- The detector consists of a readout board with 768 physical channels which are activated by clusters of electrons. Analogue Pipeline Voltage (APV) chips connect to each channel and when activated, record a snapshot of the voltage on each channel over time.
-
- The detector is arranged in series with four standard planar trackers. The trajectory of each cluster is calculated using the planar positions. The trajectories are used to predict the expected position of each event on the detector. The predicted positions are used to verify our reconstructed positions.

System Architecture



Data Analysis



[event pulse plot/histogram]

[tracker alignment per iteration plot]

[det5 residual plot]

Results

[explain in bullets share insights, challenges, result stats]

Conclusions

[explain in bullets final pipeline and usuability features, also future work]

Acknowledgements

Thank you to our advisor: Dr. Marcus Hohlmann. Thank you to our mentor: Pietro Iapozzuto. Thank you to Dr. Phillip Chan and the members of the Hohlmann Research Group for additional guidance.

Title (the shorter the better, include key words)

Team Member Names

Faculty Advisor(s): (their name/s), Dept. of ____, Florida Institute of Technology

INSTRUCTIONS

- **Do not use a color background**
- **Keep all content within the gold lines and blue and crimson bars (other than title block and icons)**
- **Do not change the size of the poster**
- **Please keep the text readable. The only font allowed is "Calibri". It is available on all Microsoft products . Minimum font size is 48 pts.**
- **The size is already set to exactly the print size. Please arrange and size all the images and text properly.**
- **Ensure that all images are at least 300 dpi**
- **The name of any faculty should be put in as "Dr. [First Name] [Middle Initial]. [Last Name], Dept. Of [name of department], [name of institution]**
- **Names of any sponsors, mentors, volunteers, helpers, etc. can be put in the acknowledgements section. Put in text only. Do not put in any additional logos in the poster other than the ones already in the template.**

***Your Poster file should be named as follows*:**

SHOWCASE_SPRING2027_POSTER_CAPSTONE MAJOR_YOURTEAMNAME*

(Example: SHOWCASE_SPRING2027_POSTER_ME_SUNNUCLEAR)

Note: The project name should be exactly as the registered project name.

***If this is an individual project, please place the title of your project instead of the team name**

Please follow all instructions above.

The submission may be rejected if the formatting guidelines are violated or the file is not properly named.

****delete this text box****