ELECTRON DETECTION FOR THE JEFFERSON LAB HALL A COMPTON POLARIMETER

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Outline

- Physics Motivations: Parity Violation in PREX and CREX
- Compton Polarimeter
- Silicon Strip Detector
- QWEAK Amplifier-Discriminator Board (QWAD)
- Preliminary results
  - QWAD Pulse Tests

Physics Motivations: Parity Violation

- Some of the experiments at Jefferson Lab involve parityviolating electron scattering
- This is true for the experiments PREX (Pb Radius EXperiment) and CREX (Ca Radius EXperiment)
  - Parity violating weak force scattering is used to find the radii of the isotopes ^{208}Pb and ^{48}Ca
- Electron spin is key to distinguishing the parity-violating weak interaction from electromagnetic reaction

Compton Polarimeter

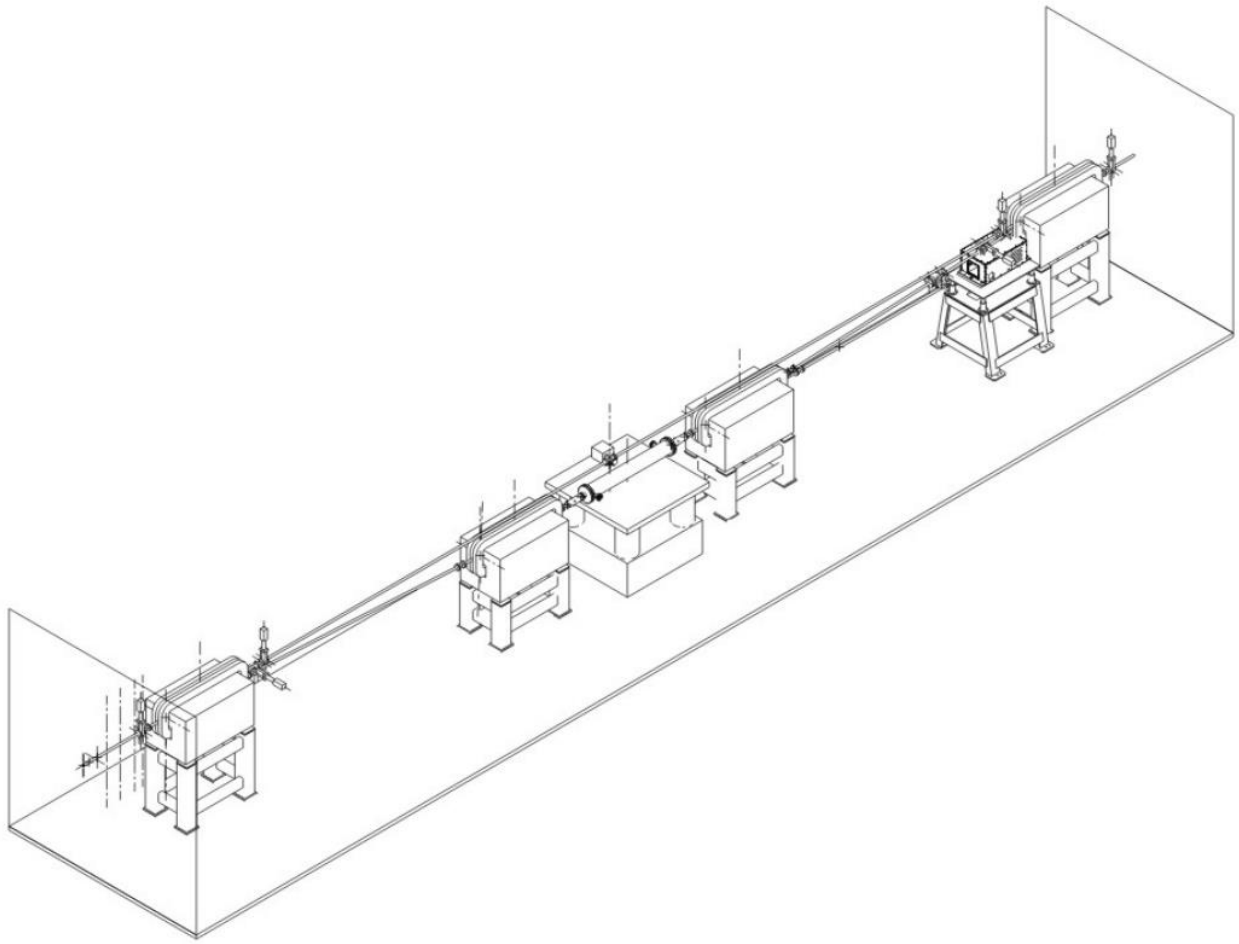
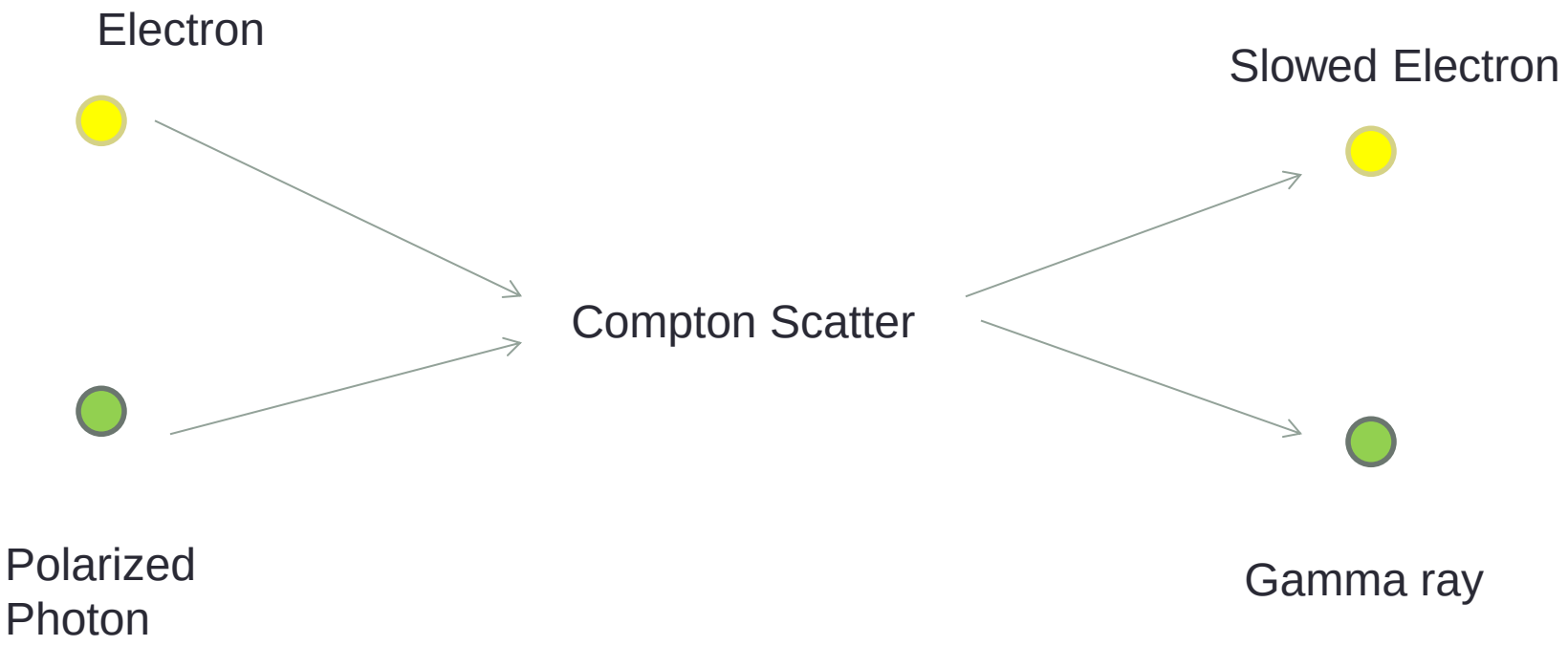
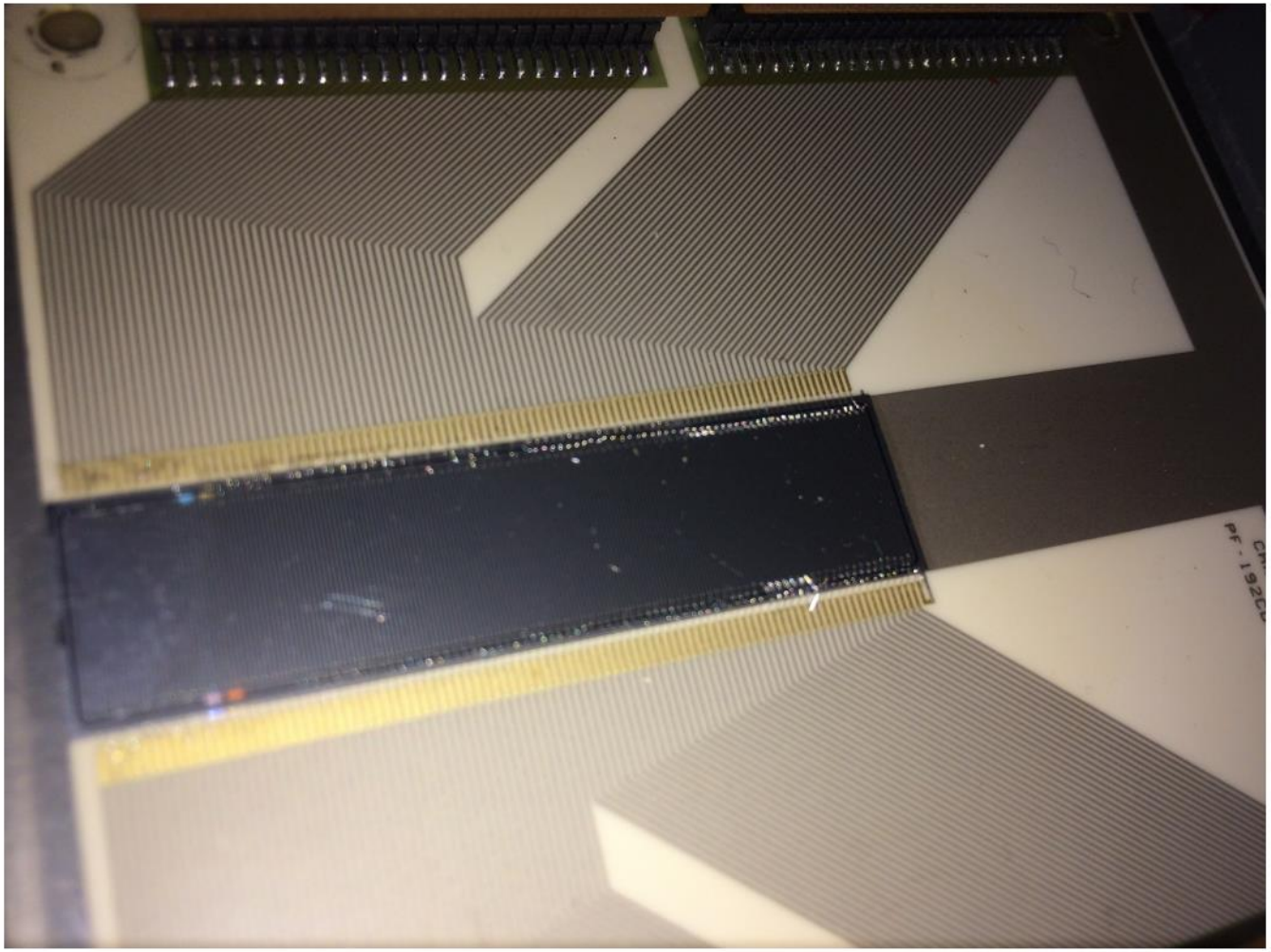


Figure 12: ***Proposed setup***

Compton Polarimeter

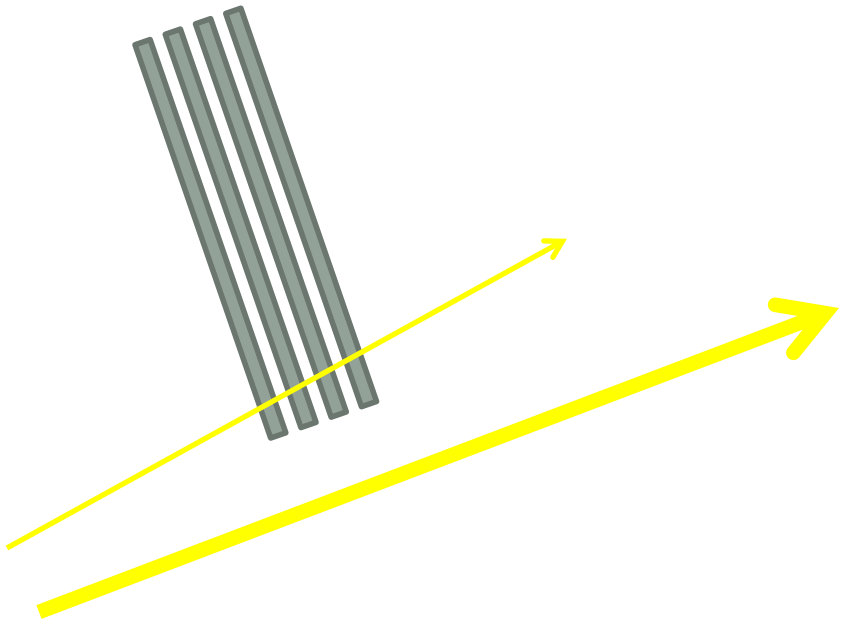


Silicon Strip Detector



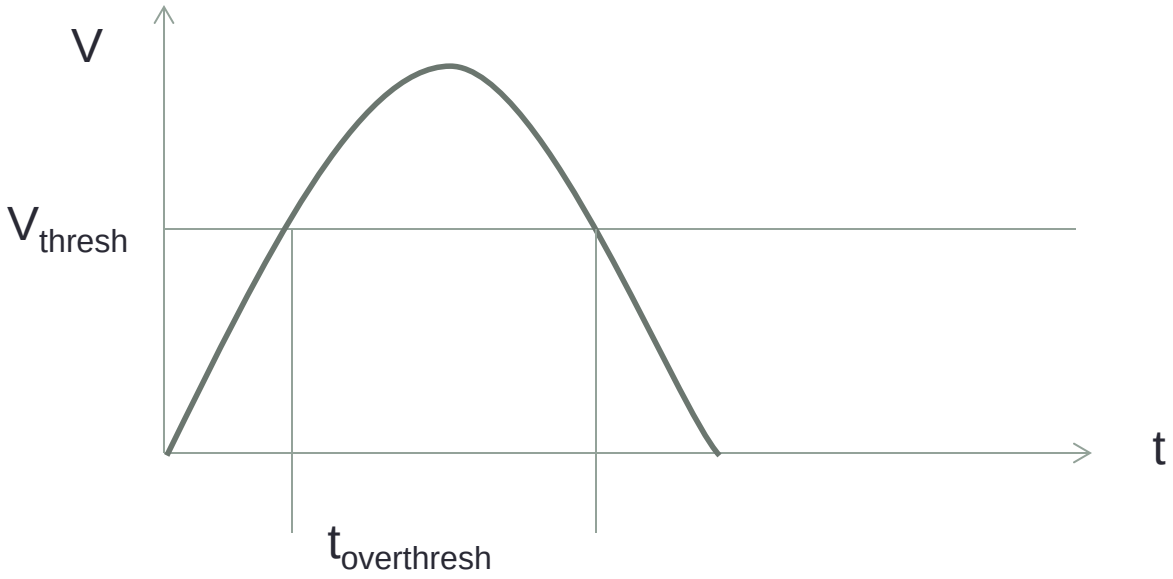
Silicon Strip Detector

- Allows for determination of 1-D position on a single plane
- Four planes in parallel with each other
- Can allow us to determine momentum of electrons

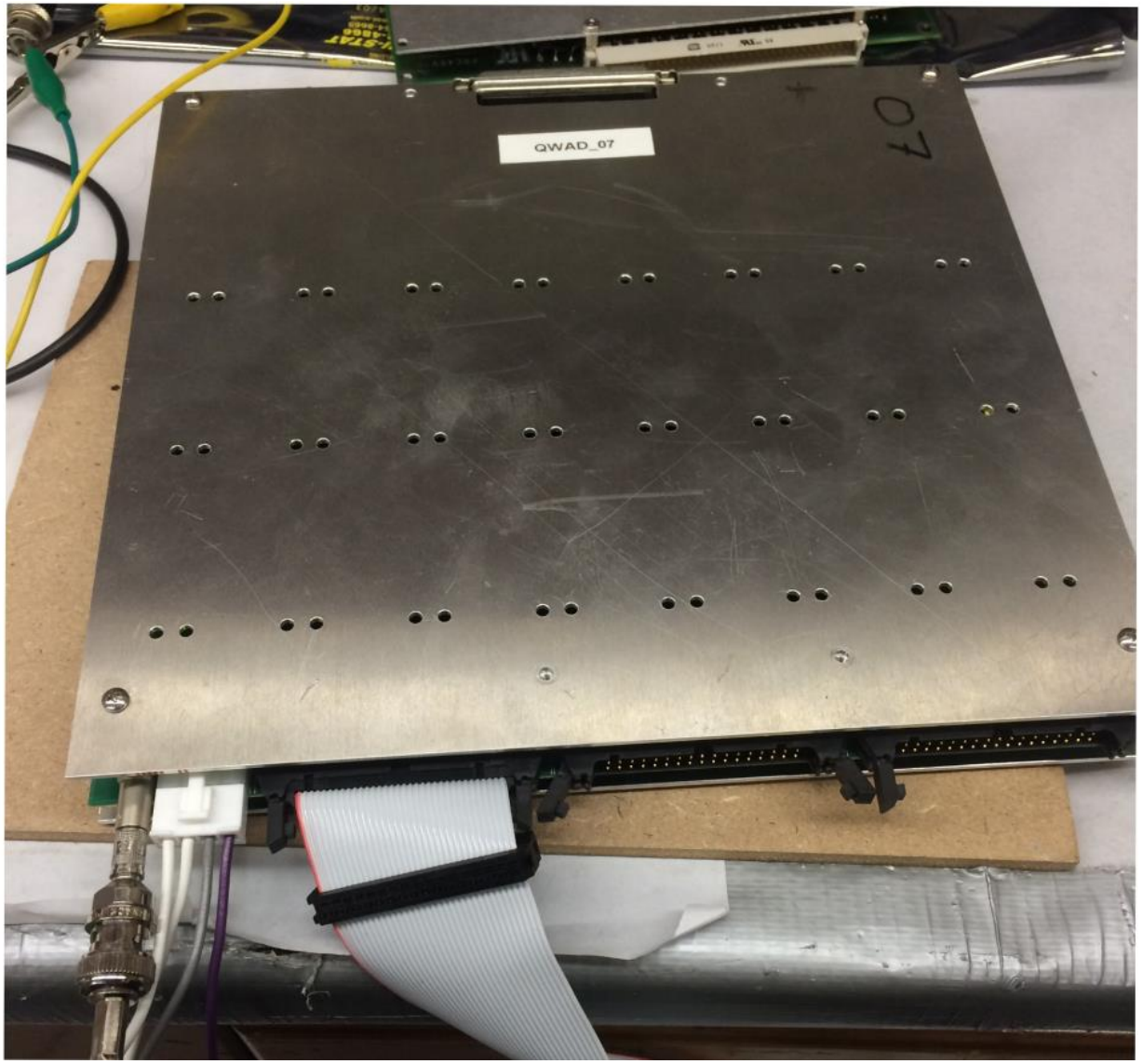


QWAD

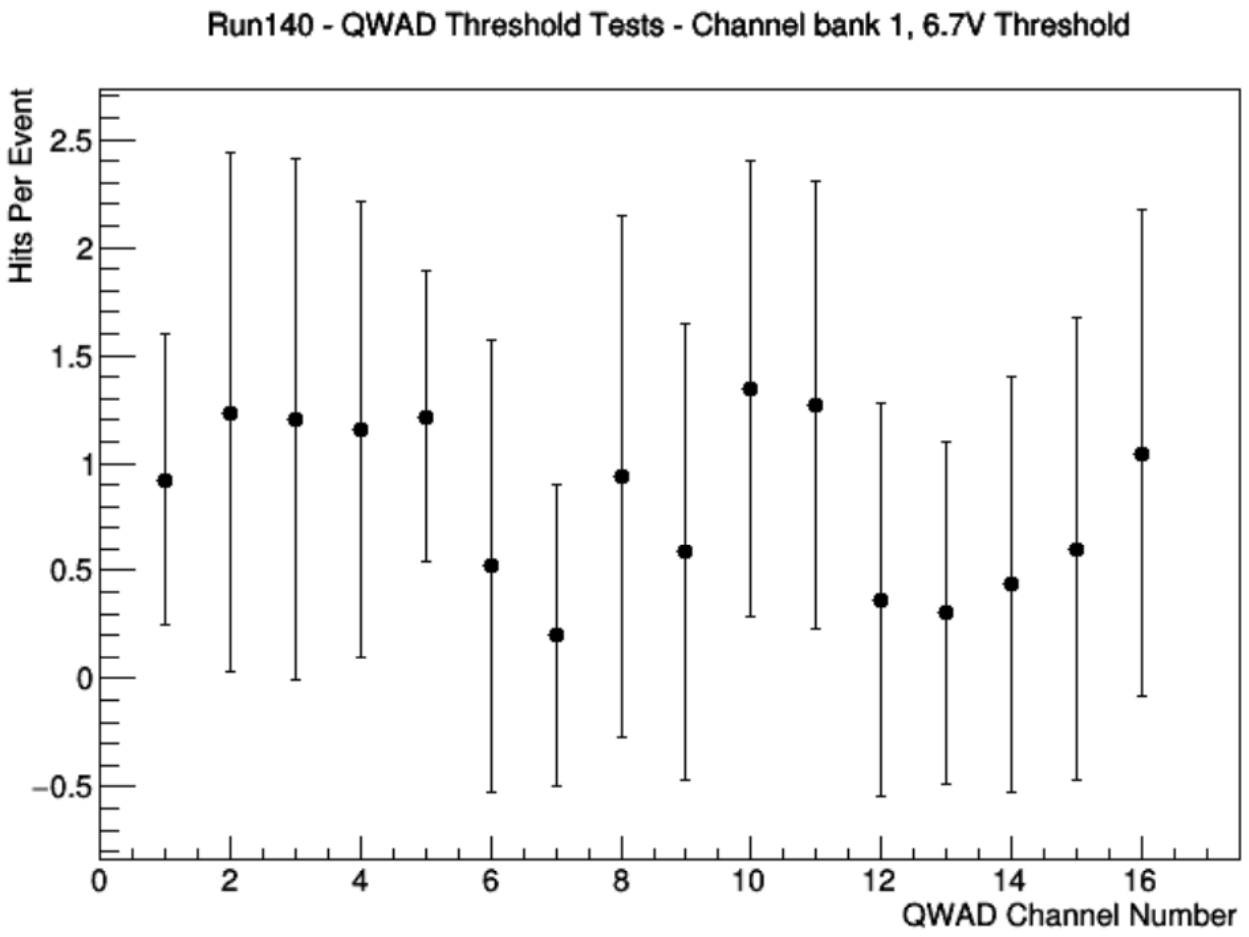
- Originally made for use with Hall C Polarimeter
- Time over Threshold
- Might be useful as of the last upgrade for usage with the silicon strip detector



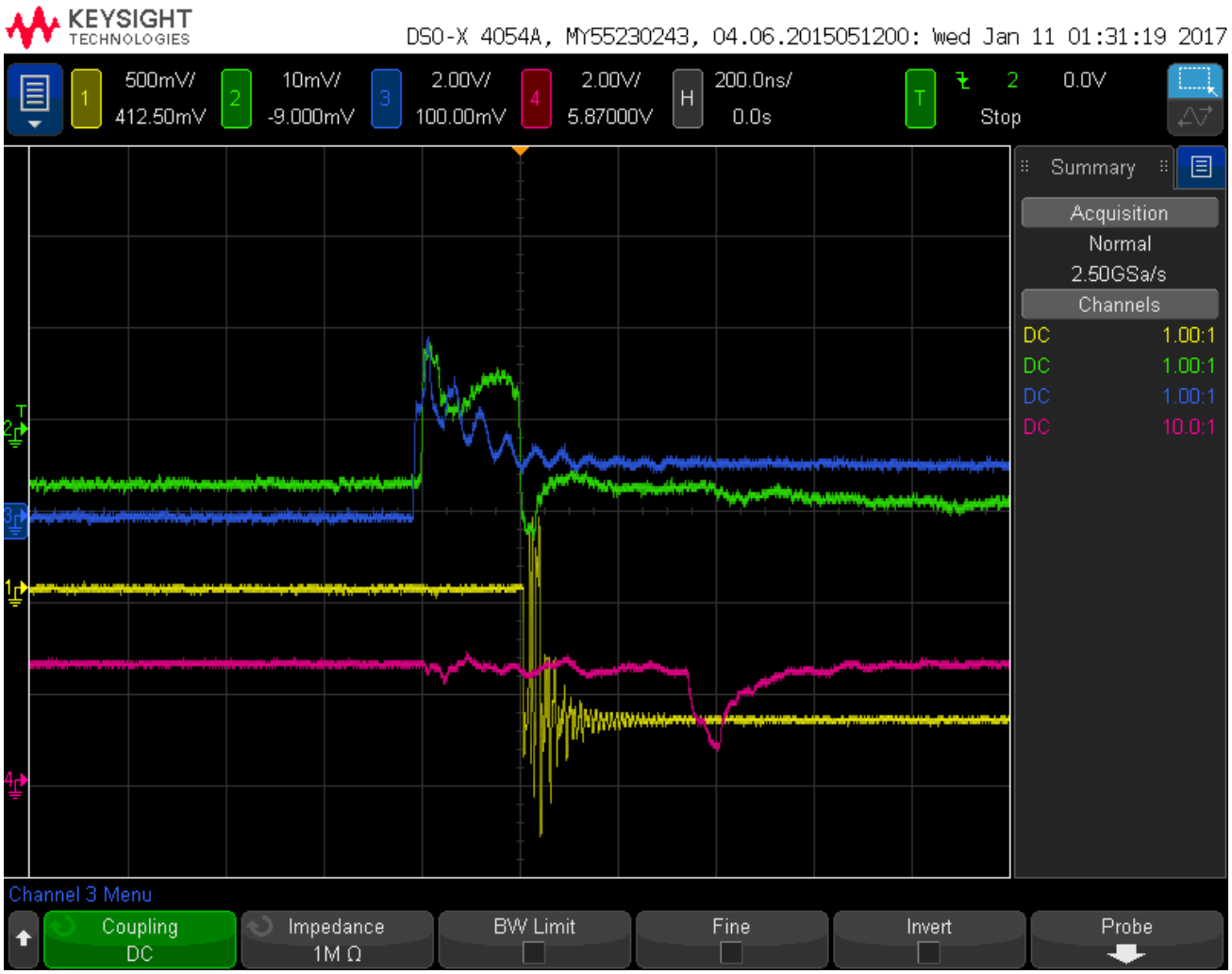
QWAD



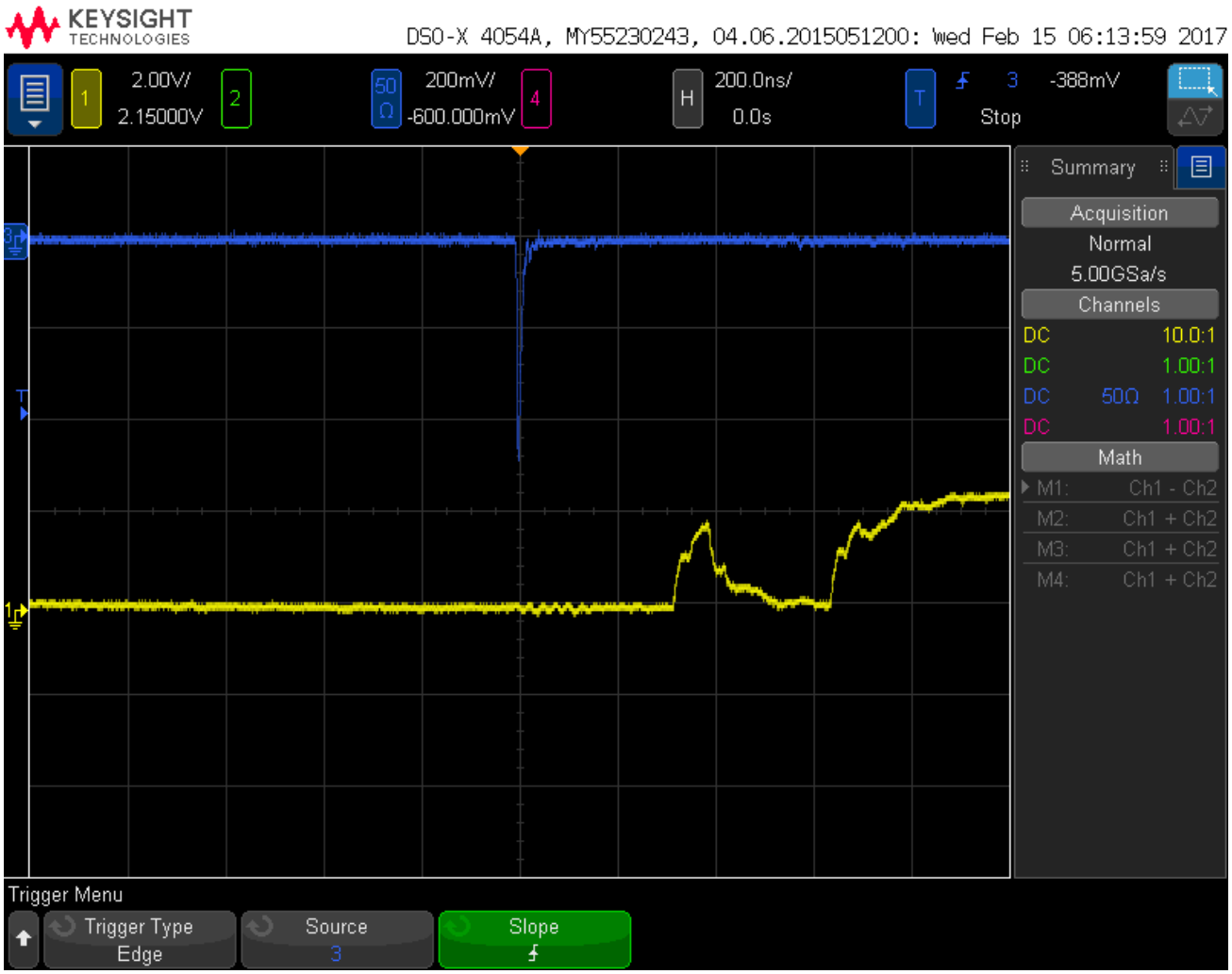
Preliminary Results – Board Tests



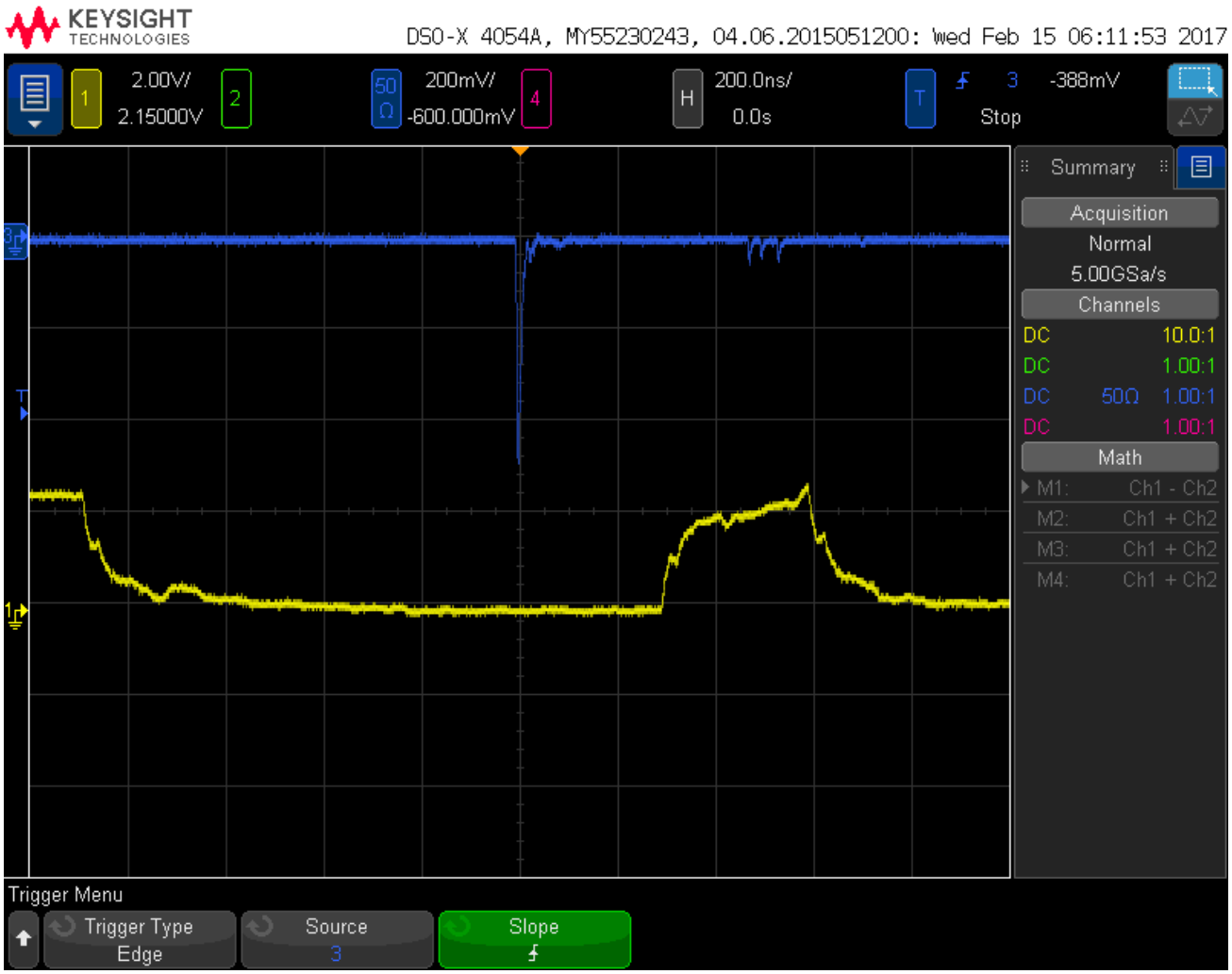
Preliminary Results



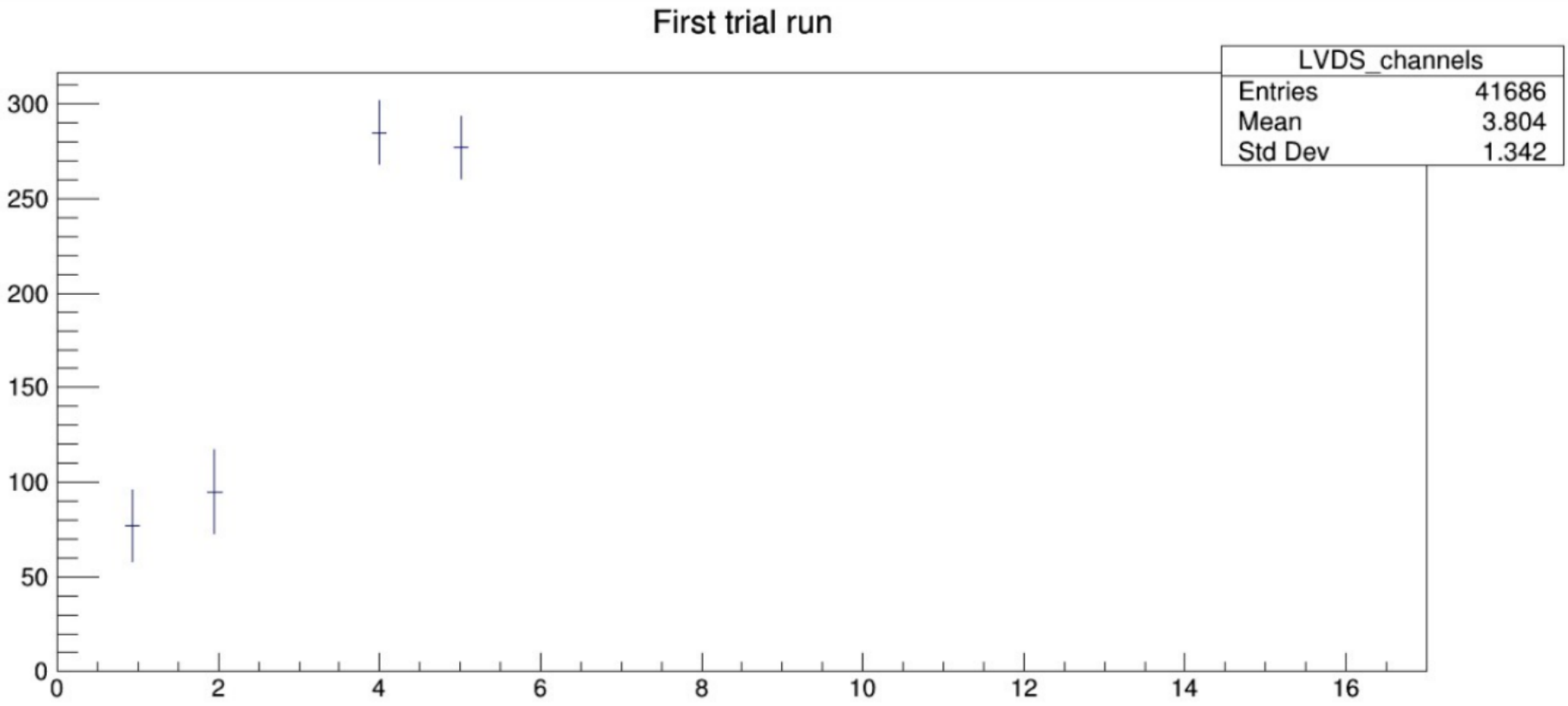
Preliminary Results ^{60}Co Test



Preliminary Results ^{60}Co Test



Preliminary Results - Cosmics



Acknowledgements

- My advisor Dr. Juliette Mammei
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- The Jefferson Lab Hall A Compton Polarimeter team

Sources for Non-Original Images

- Slide 4: “Conceptual Design Report of a Compton Polarimeter for Cebaf Hall A” May 1996, G. Bardin et al

Thank you/Merci

- Any questions?