

DAQ of UITF 200 keV Mott Polarimeter

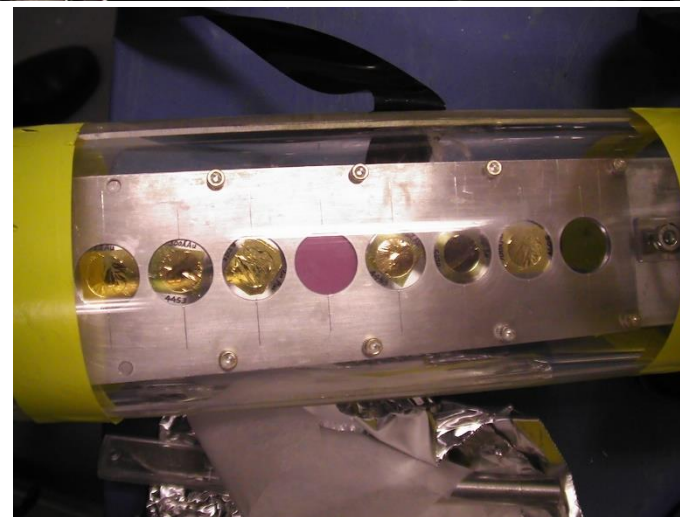
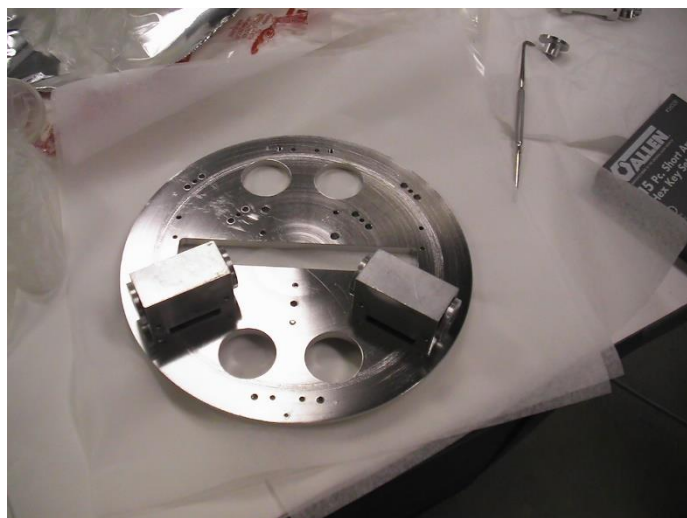
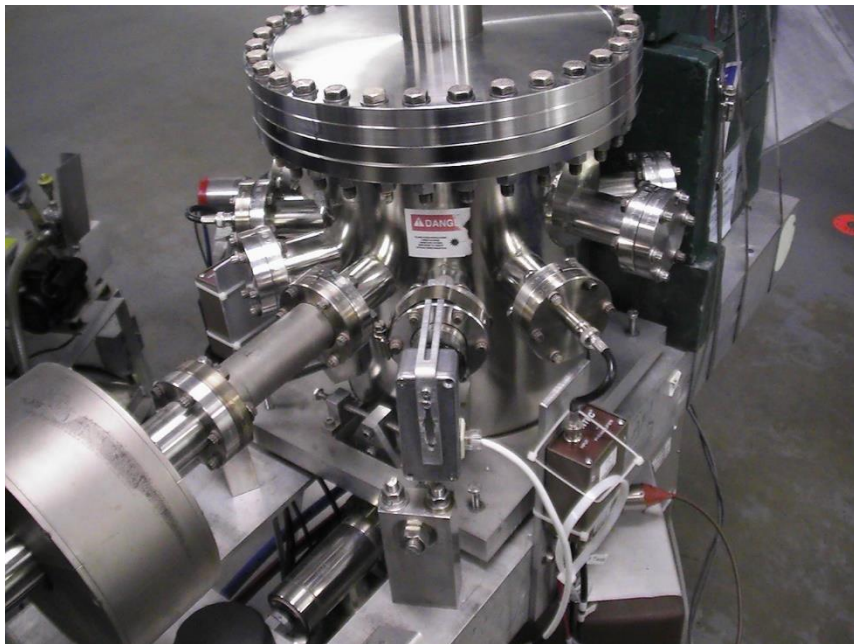
New 200 keV Mott DAQ

Daniel Moser and Riad Suleiman

Friday, October 16, 2020



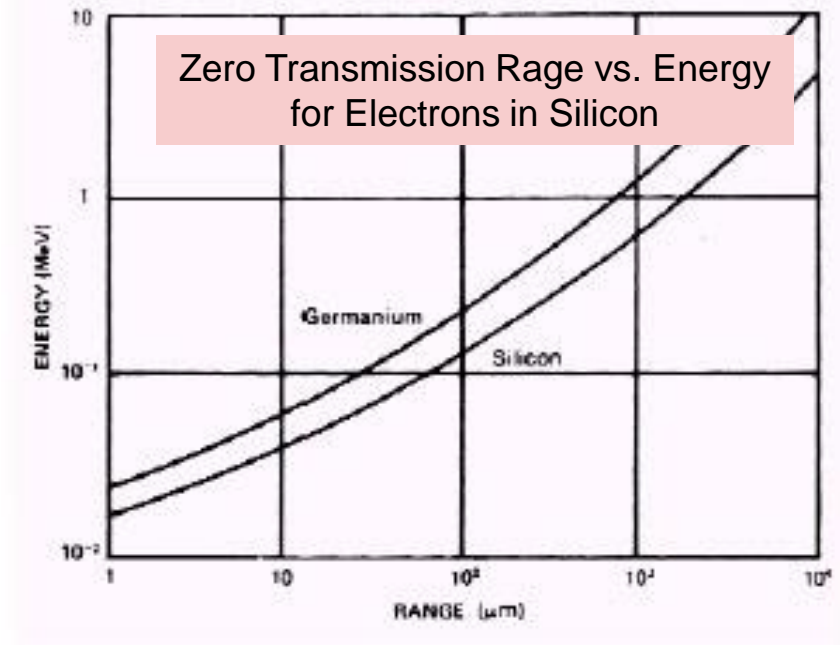
Vacuum Chamber



- Have these modules:
 - (1) ORTEC 710 Quad High Voltage Bias Supply (1 - 1000 V)
 - (2) ORTEC 142A Preamplifier for detector input capacitance 0 to 100 pF (conversion gain 45 mV/MeV)
 - (2) ORTEC 142B Preamplifier for detector input capacitance 100 to 400 pF (conversion gain 20 mV/MeV)
 - (2) ORTEC Model 590A Amplifier and Timing Single-Channel Analyzer (SCA)
 - (2) ORTEC Model 570 Amplifier

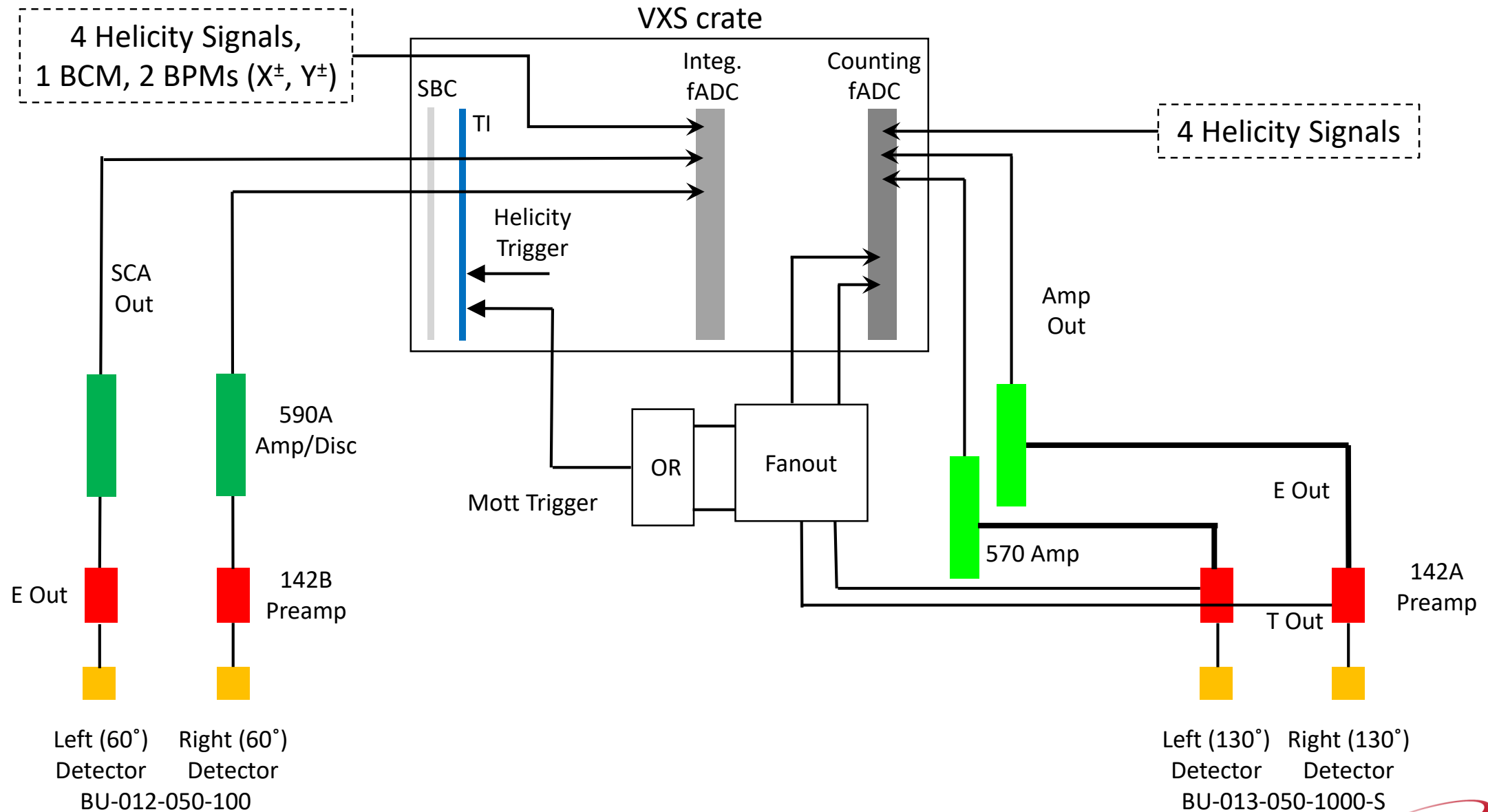
ORTEC Detectors

- (2) ORTEC ULTRA Detectors (BU-013-050-1000-S):
 - Ion-Implanted Silicon Charged Particles Detectors
 - Ultra-thin entrance window (500 Å) for optimum energy resolution (FWHM, $\alpha = 13$ keV, $\beta = 7$ keV)
 - B Mount
 - Detector size of 50 mm²
 - Depletion Depth (Range) of 1000 μm for energies ≤ 500 keV
 - Bias Voltage: +115 V
- (2) ORTEC ULTRA Detectors (BU-012-050-100):
 - Ion-Implanted Silicon Charged Particles Detectors
 - Ultra-thin entrance window (500 Å) for optimum energy resolution (FWHM, $\alpha = 12$ keV, $\beta = 6$ keV)
 - B Mount
 - Detector size of 50 mm²
 - Depletion Depth (Range) of 100 μm for energies < 200 keV
 - Bias Voltage: +50 V

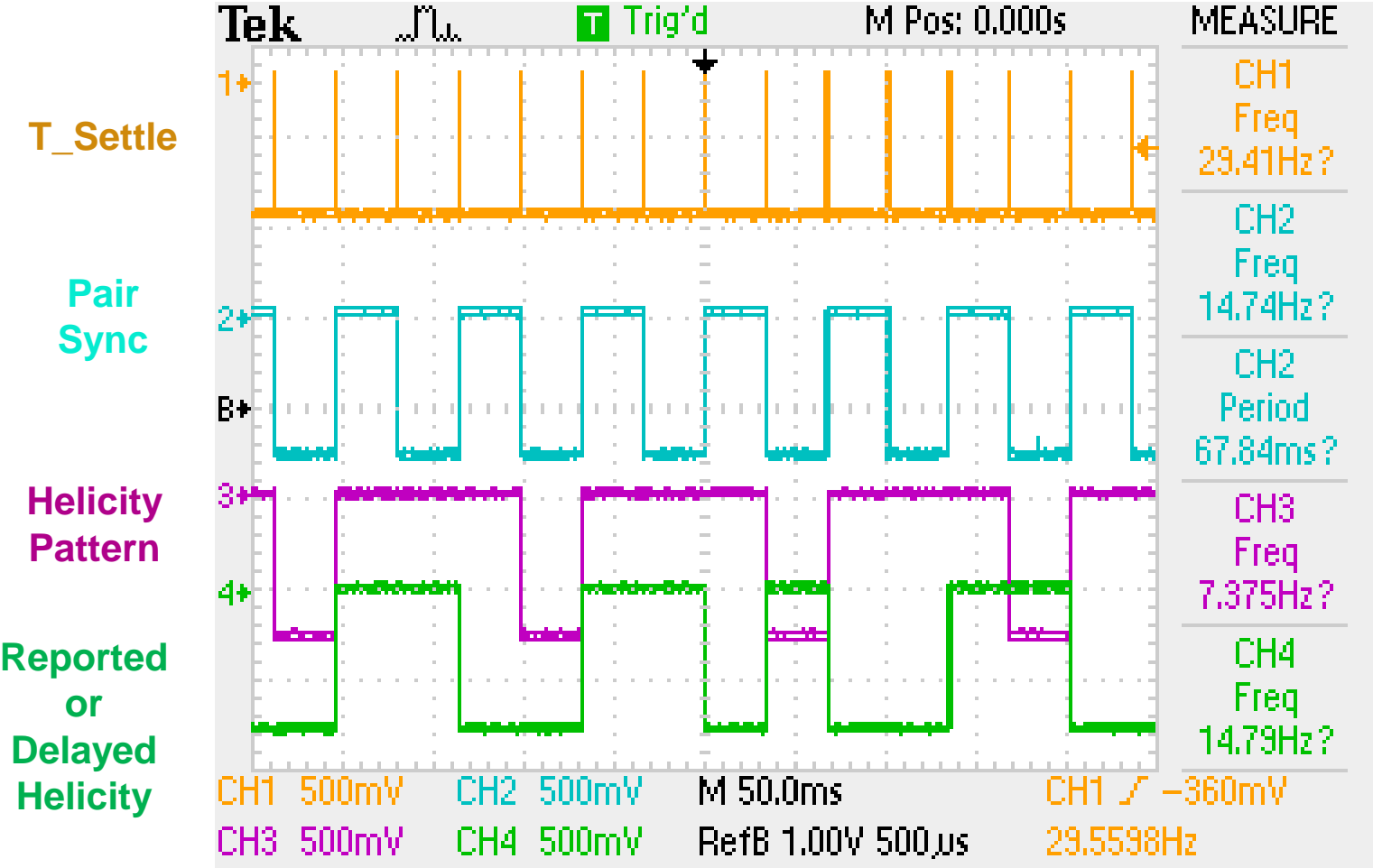


Design of UITF 200 keV Mott Polarimeter

DAQ Schematic Diagram



Helicity Signals



New DAQ for Mott Polarimeter

- Measure Mott asymmetry (event counting)
- Measure Charge asymmetry (per helicity)
- Measure position differences (per helicity)
- DAQ Triggers:
 - Mott Detector
 - Helicity
- DAQ Hardware:
 - VXS crate (Ordered)
 - XVR-16 from Abaco Single Board Computer (SBC) (Ordered)
 - Jefferson Lab Flash Analog-to-Digital Convertor (fADC250) (quantity = 2) (On-site)
 - Trigger Interface (TI) (On-site)
 - Front Panel Signal Distribution module (On-site)
 - Desktop (Ready to Order)

Installation Timeline

- DAQ design and procurement: October – December
- CODA and Firmware: January
- Data decoding and analysis: January - February
- DAQ tests: January – February
- Ready for beam: March 1, 2021

Cables, ...

- (4) Bias cable, SHV connector, 0 - +/- 1000 V, male connectors
- (2) E 142A preamp 93-ohm cable, RG62A/U BNC, male connectors
- (2) T 142A preamp 50-ohm cable, RG58A/U BNC, male connectors
- (2) Test 142A preamp 50-ohm cable, RG58A/U BNC, male connectors
- (2) 142A preamp power cable, 9-pin D connectors (amphenol 17-10090), female in cave, male in service rack



- (2) E 142B preamp 93-ohm cable, RG62A/U BNC, male connectors
- (2) 142B preamp power cable, 9-pin D connectors (amphenol 17-10090), female cave, male in service rack



Jefferson Lab

Friday, October 16, 2020

