

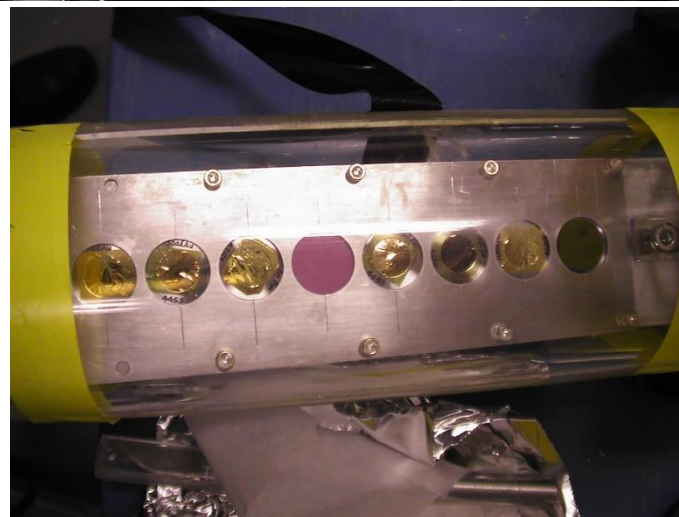
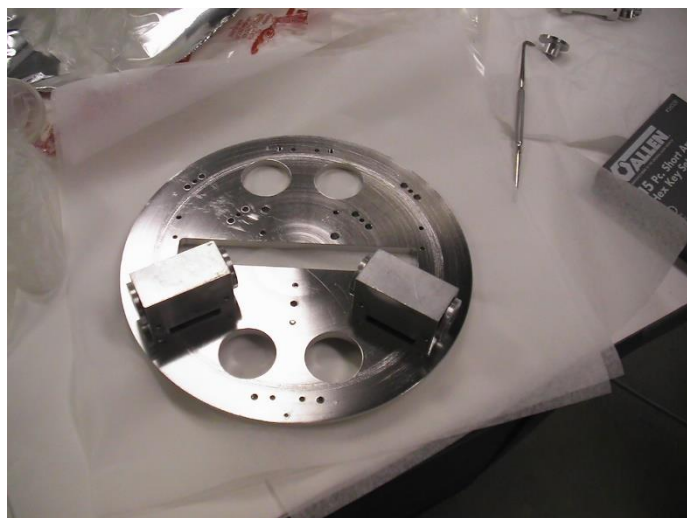
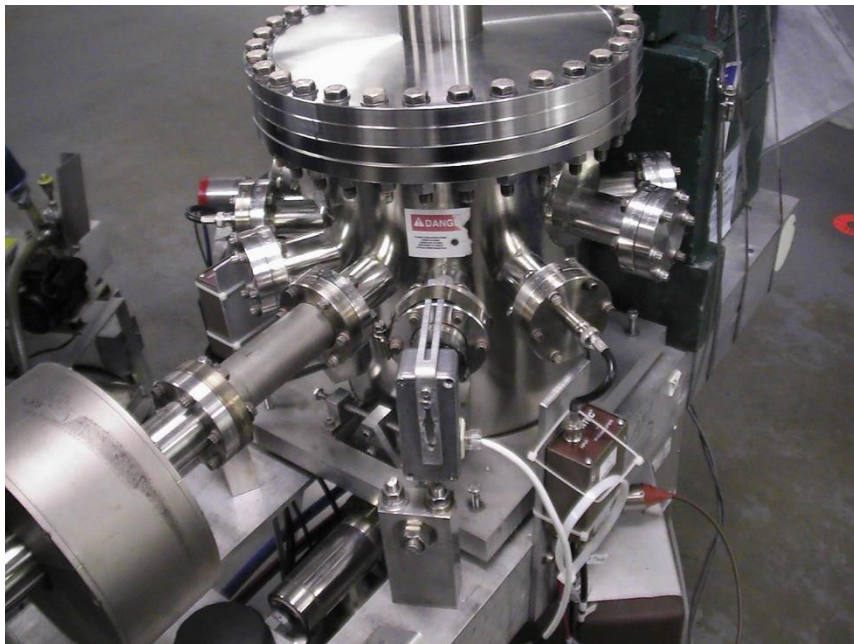
DAQ of UITF 200 keV Mott Polarimeter

New 200 keV Mott DAQ

Daniel Moser and Riad Suleiman

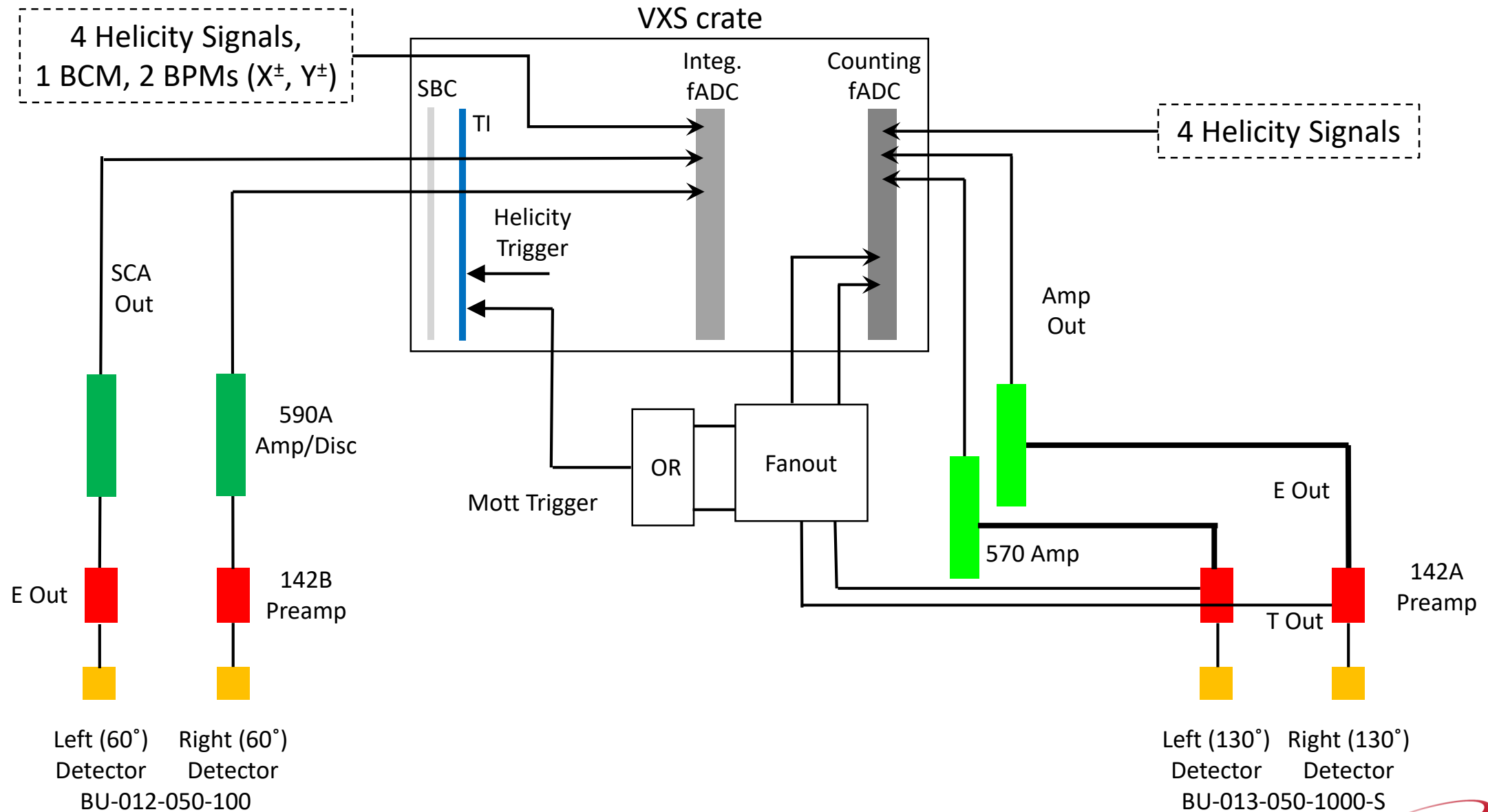
Friday, October 16, 2020

Vacuum Chamber



Design of UITF 200 keV Mott Polarimeter

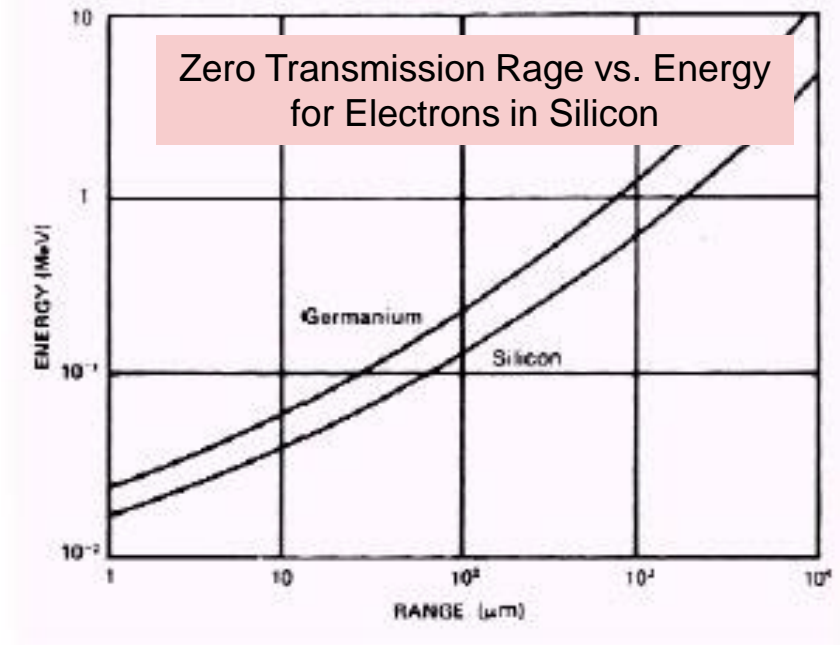
DAQ Schematic Diagram



- 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 (On-site)

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 μ m 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 μ m for energies < 200 keV
 - Bias Voltage: +50 V



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) T 142B preamp 50-ohm cable, RG58A/U BNC, male connectors
- (2) Test 142B preamp 50-ohm cable, RG58A/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

