

# ***DAQ of UITF 200 keV Mott Polarimeter***

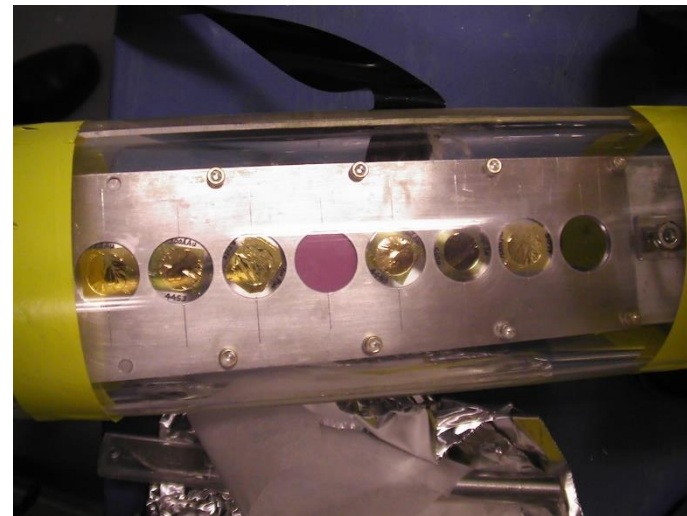
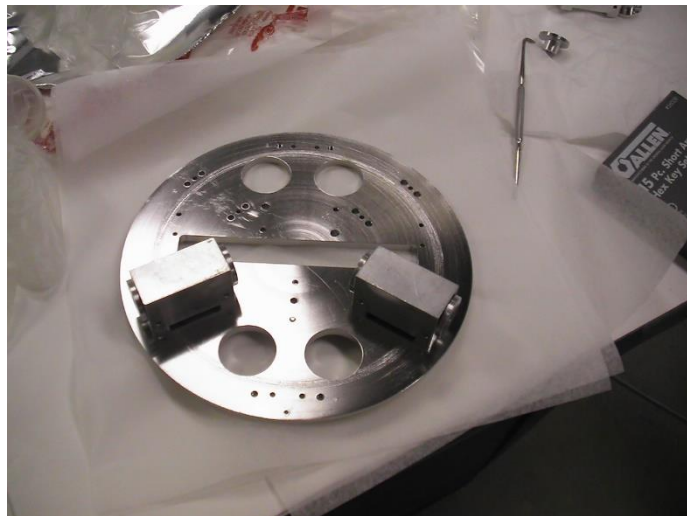
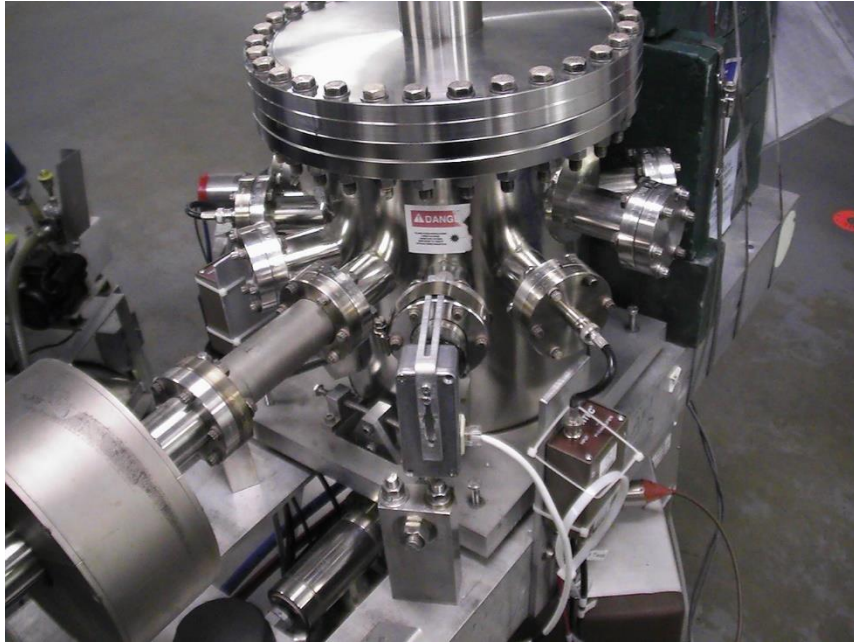
New 200 keV Mott DAQ

Daniel Moser and Riad Suleiman

Friday, October 16, 2020



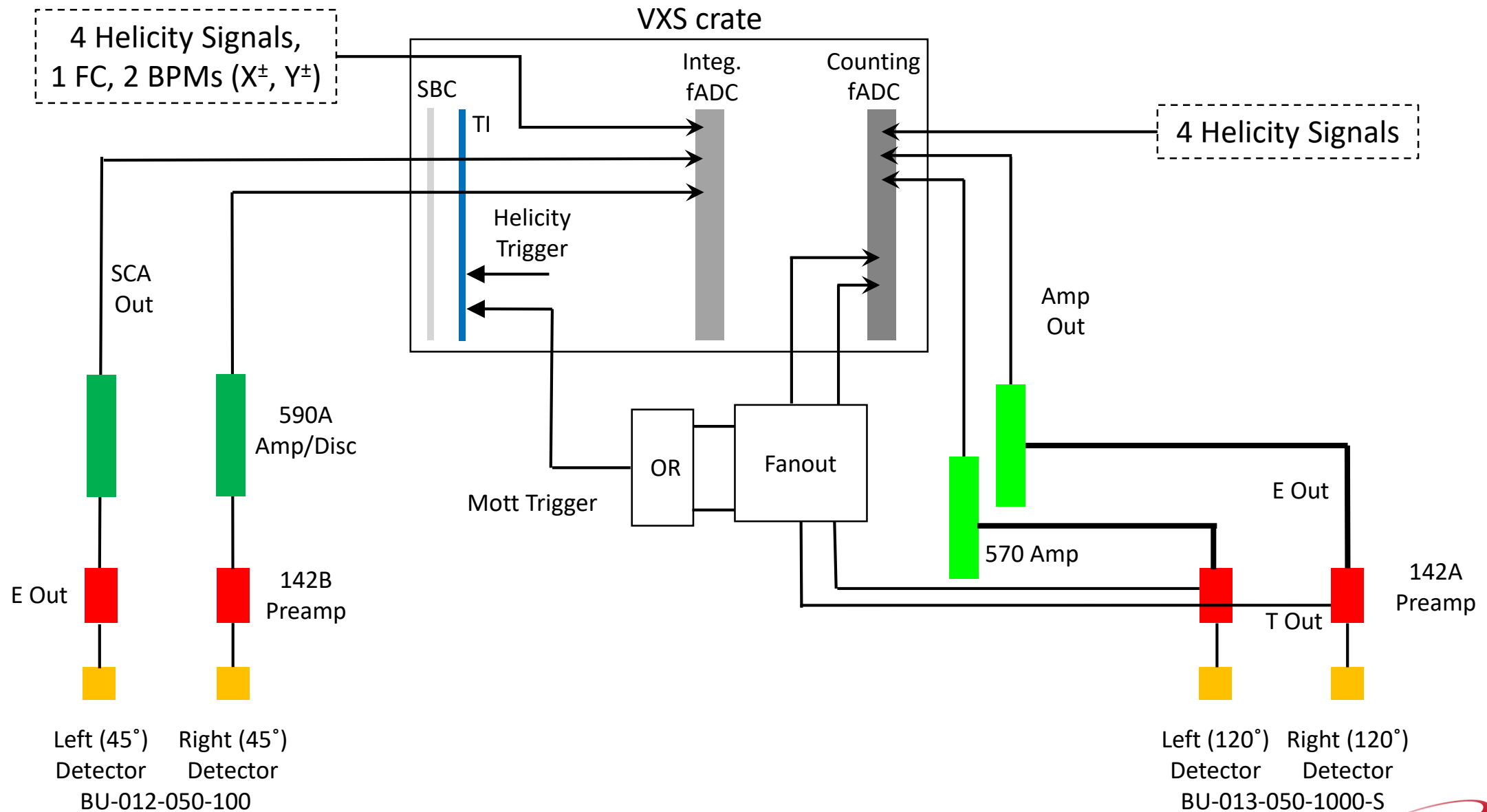
# Vacuum Chamber



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# Design of UITF 200 keV Mott Polarimeter

# DAQ Schematic Diagram



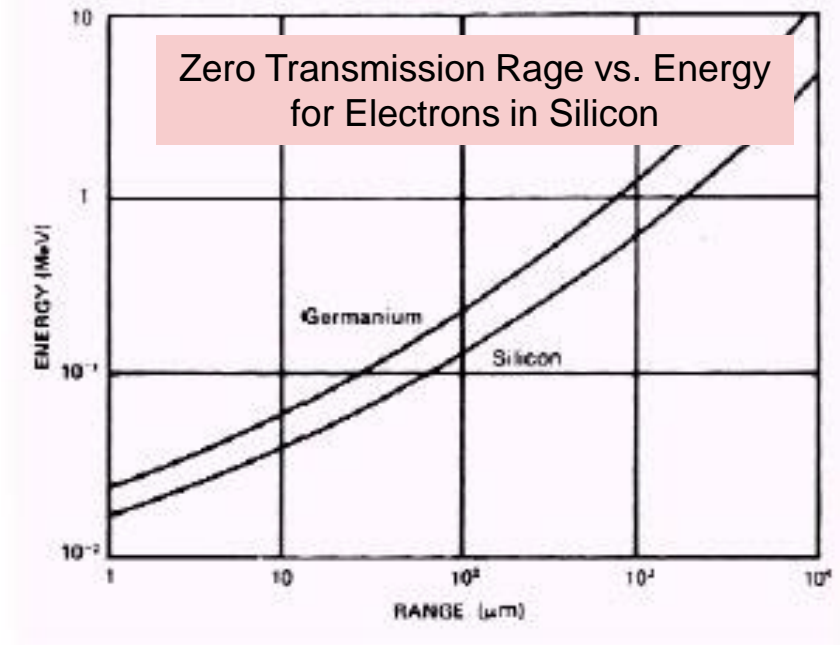
# ORTEC Electronics

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- 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 mm<sup>2</sup>
  - Depletion Depth (Range) of 1000  $\mu\text{m}$  for energies  $\leq 500$  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 mm<sup>2</sup>
  - Depletion Depth (Range) of 100  $\mu\text{m}$  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

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- 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 -  $\pm 1000$  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

