Polarimetry Kickoff Meeting
Feb 12, 2021

Euclid: Eric - Jim - Andrei
JLab: Joe - Riad - Marcy - Dave Meekins - Danny Machie (designer)

Agenda:
Overview

- Dates (SBIR 2/17 to 11/17, CRADA ends 9/27. Funding won't arrive until mid-March.)

Goal: Reduce Mott polarimetry uncertainty from 0.6% to <0.5%. Mitigate: a) limited to 1 uA due to heating, b) systematic RC uncertainties, c) in Phase II operate Mott for first time above 10 MeV
Deliverables according to Narrative
2-3 Targets, 3.2 mA-hr of asymmetry data, RC calculations for carbon, and 3D models for cooled ladder, DAQ, and beam dump.
Objectives:
Task 1: Simulations of carbon scattering asymmetry and radiative corrections.
Task 2: Target and holder design, fabrication, metrology, and installation.
Task 3: Scattering asymmetry measurements.
Task 4: Design of high-current target ladder, DAQ, and beam dump.
Task 5: Calculations for high-precision test protocols with multiple target thicknesses.
Task 6: Report

Big ones are 1, 2, and 3.
Task 2 has to complete in the next 16 weeks including vendor lead times!!

- Experiments (April-May install, June-July experiments) Update: CEBAF drives all. Mid-June earliest install, end July done with experiments. Plan B (non-CEBAF): 200 kV at UITF summer install of Mott, easier beam time, 100s of uA to 1 mA?

Long poles right now:

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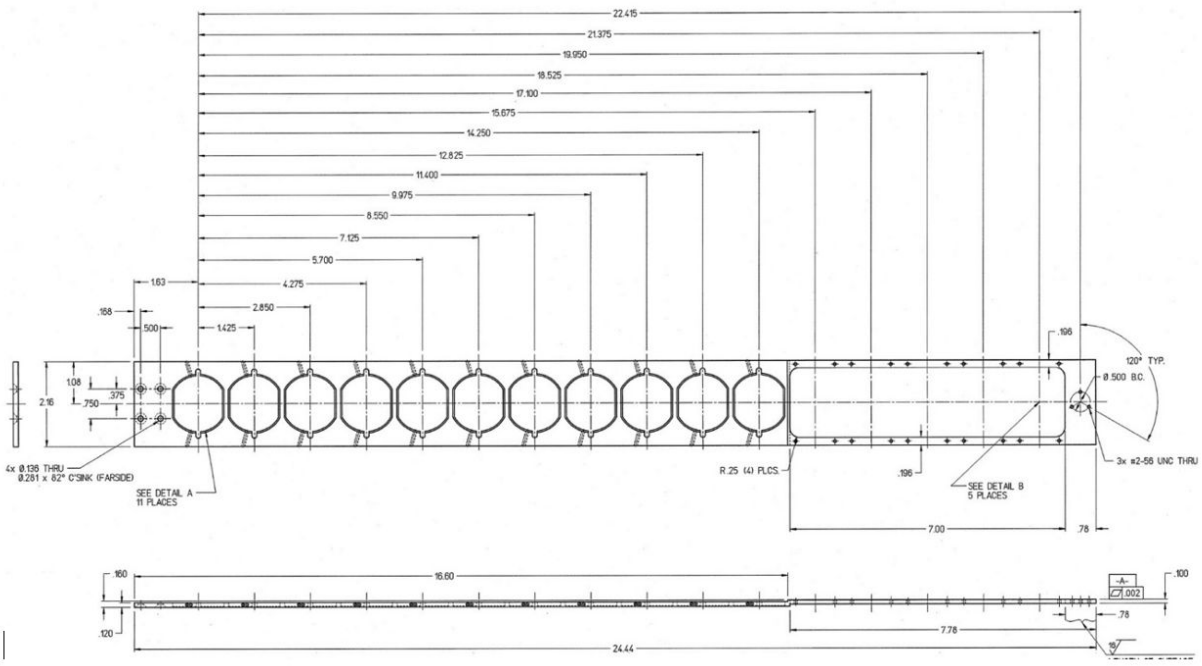
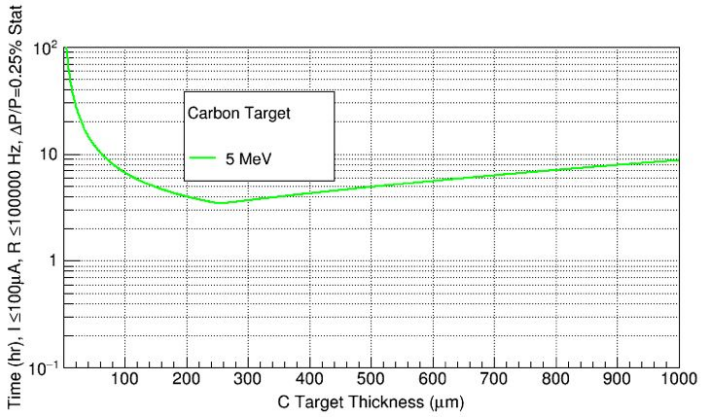
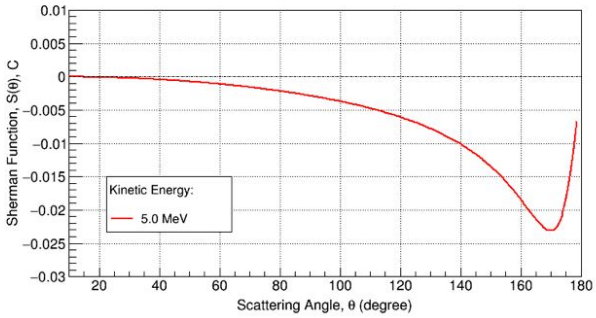
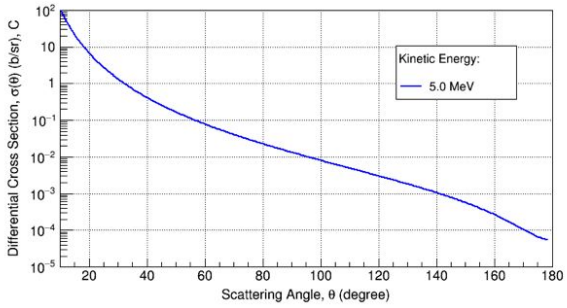
- Target ladder decision - old or new New or 5-psn Cu cooled (2012) / Danny Machie
- How to align beam to a 2mm diamond target without 2nd stepper
- Can we do <4.44 MeV with 100 uA?
- Under 0.5mm beam FWHM?

- Current limit - avoid destroying diamond before end of tests, need calc, Andrei + Dave Meekins? Hall A experience?
- Optimizing Beam Time usage - vs target types, energy, etc
- Counting targets: 2 gold, 4 diamond, 1 phosphor, 1 extra?
- Round or square? Joe will check
- Tilt on ladder for other axis manual adjust, port aligner?
- How to ensure normal incidence? For 0.1% thickness unc'ty, cosine in your favor but need <2.5º from normal, aligned in 2 axes. Standard approach? (Survey ladder in)
- JLab student involvement? Don't want on critical path for April install (Andrei has possible)









Wrap-Up

- Regular biweekly this time? Eric, Andrei, Joe minimum 30 minutes.

To-Do

- Joe - distance flange to beam center CEBAF vs UITF
- Joe - copper ladder drawings if available, cooling spec, what would have to change to get it installed in CEBAF or UITF
- Marcy - select gold targets
- Jim - poly diamond sandwich design sketches (how mount to single crystal, metal)
- Joe/Marcy - get existing tunnel camera framed with central beam pixel on old ladder and not moved before June install
- Riad/Marcy - any tech note on thickness, statistics, target and beam scans?
- Riad - send Euclid the tech notes on asymmetry as function of data rate?
- Joe - check if all gold, diamond, and phosphor can be round (no square ladder mounts needed)
- Andrei/Mike - could send Euclid the Hall A diamond data, also work w/Andrei on thermal after Euclid provides the ladder design (can do limiting case of all-radiative early)
- Biweekly with core (Eric, Andrei, Joe) and add others as needed, 30 minutes at 3pm Fri Eastern time