Beam Current Limits for the Mott Experiment…

(J. Grames last updated Feb. 6, 2013)

Low End : ~10 nA

- BCM limit w/ adequate signal for Q_{asym}
- Basically, limited by clock hour statistics

High End : ? μA

- BCM max calibration ~125μA at 8MeV using FC2
- Physics interest
- Dump limit for uninterrupted beam (ME calc's required)
- Target limits for damage (My calculations sufficient)
- DAQ limit for rate (now ~10kHz; Mainz <1% dead @ ~50kHz)
- PMT limit for rate (Riad, can you give us this number?)
- Target motion interlock (present 1μA limit assumes hit anything)
- What else ?

Physics Interest

- $I_{scatter}$ / I_{beam} as a function of target thickness (degree of multiple scattering)
- Demonstrate systematic insensitivity and operation over a large dynamic range
  - MAINZ program (1nA to 30μA) and they report (5nA to 45μA)
  - JLAB program (100pA to 200μA) and we will report (X to Y)

Tioukine, Aulenbacher, and Riehn — Rev. Sci. Instrum. **82**, 033303 (2011)

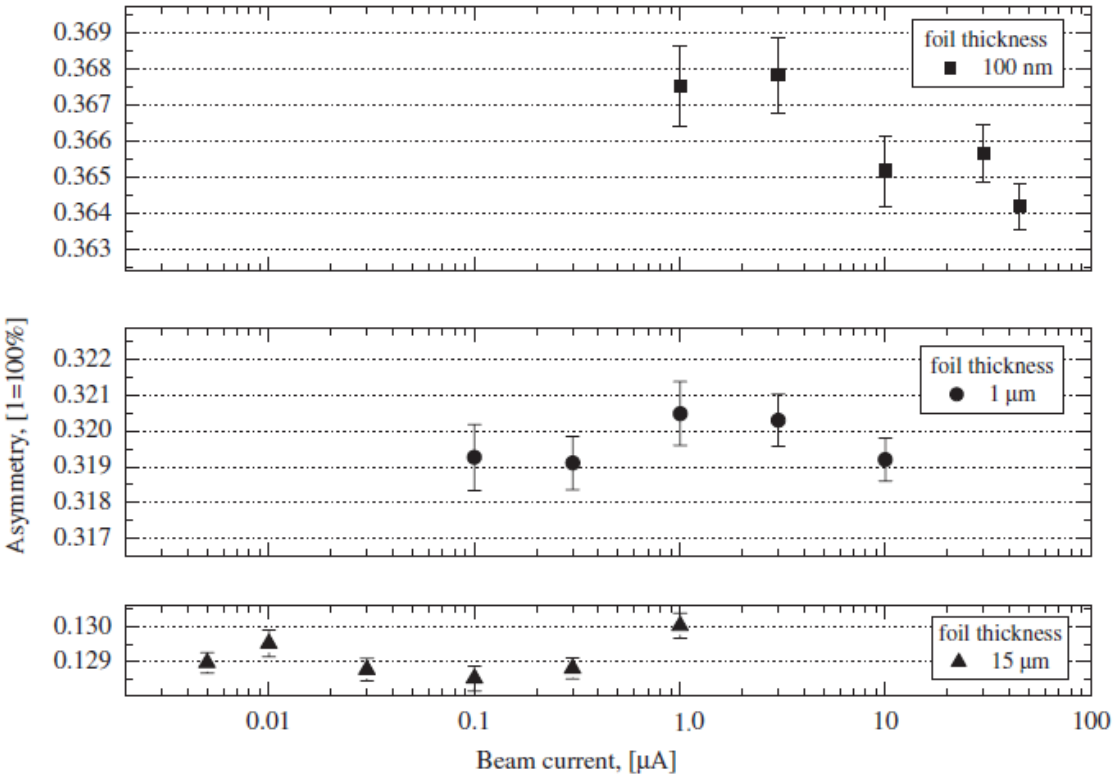

FIG. 5. Asymmetry vs beam current for various targets (statistical error bars).

Dump Limits for Uninterrupted Beam

Work in progress…

- Good "template"
- Designed for 20MeV stopping range 6.3cm
- 2 gal/min adequate for 1kW (50μA)
- Brem. absorber >90%
- Simple construction (units are inches)
- Graphite photo-neutron threshold 18.7MeV