

Mott Systematics Studies

Preliminary Results for –

- Asymmetry versus Beam Momentum
- Asymmetry versus Beam Spot Size and Shape
- Asymmetry versus Beam Position on Target Foil

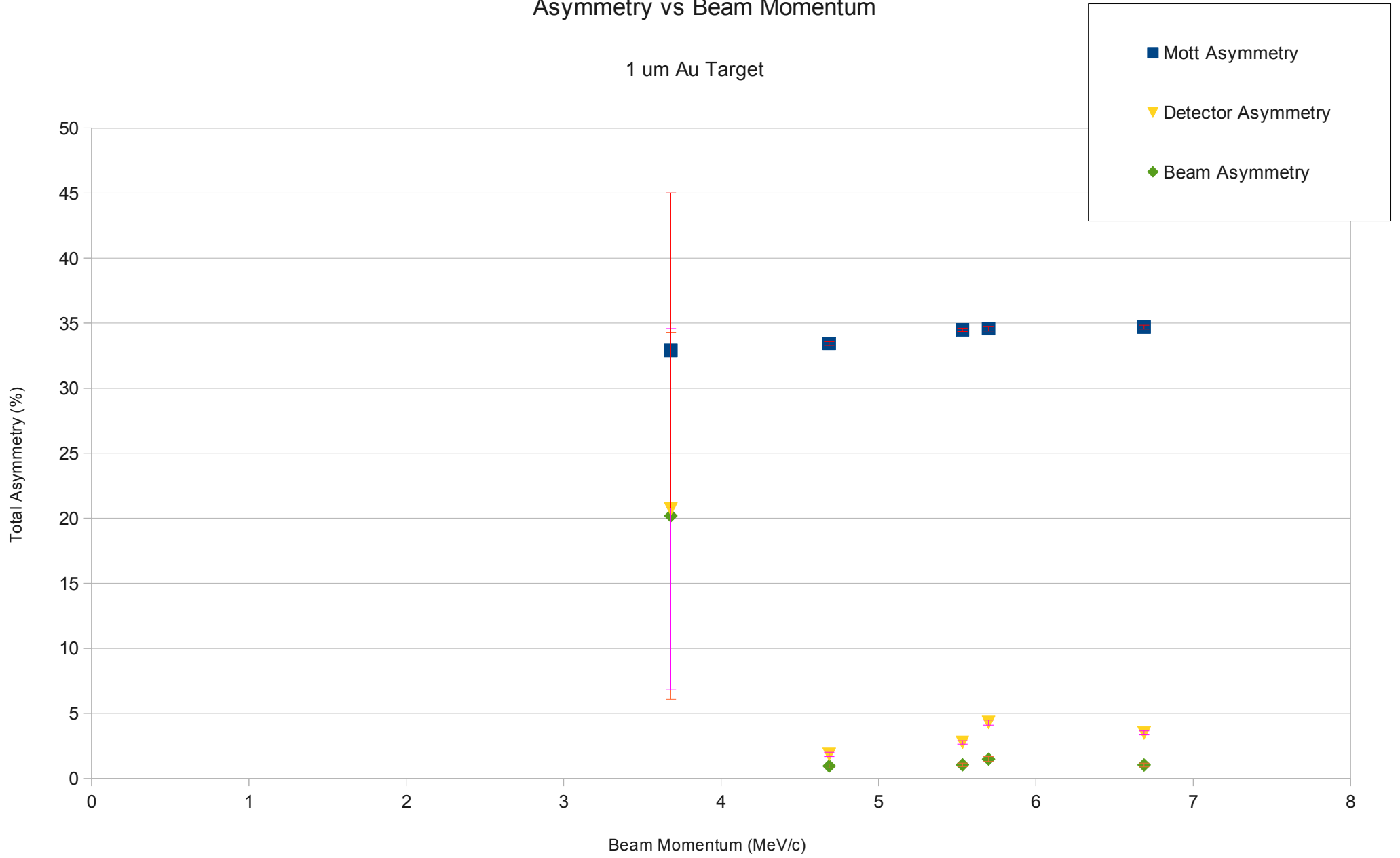
Asymmetry vs Beam Momentum

Beam Momentum (MeV/c)	Beam Current (uA)	# of Runs, 1/2 Wave Plate	Physics Asymmetry	Instrumental Detector Asymmetry	Instrumental Beam Asymmetry
3.681	0.357	2, alternating	32.903 ± 12.115	20.703 ± 13.890	20.186 ± 14.111
4.687	0.624	2, alternating	33.426 ± 0.150	1.846 ± 0.166	0.950 ± 0.156
5.534	0.796	4, all out	34.483 ± 0.127	2.764 ± 0.137	1.044 ± 0.133
5.699	0.897	2, alternating	34.578 ± 0.183	4.294 ± 0.194	1.483 ± 0.187
6.688	1.168	4, alternating	34.698 ± 0.146	3.494 ± 0.155	1.031 ± 0.152

- 1 um Au foil used
- Current set such that counting rate ~2kHz achieved, counting for 900k events

Asymmetry vs Beam Momentum

1 um Au Target



Asymmetry vs Beam Size and Shape

Run	Beam Momentum (MeV/c)	Beam Current (uA)	Physics Asymmetry (%)	Instrumental Detector Asymmetry (%)	Instrumental Beam Asymmetry (%)
7335	5.533	1.021	34.833 ± 0.319	3.904 ± 0.361	0.278 ± 0.362
7336	5.533	1.049	34.699 ± 0.320	2.558 ± 0.363	0.769 ± 0.358
7337	5.533	1.021	34.388 ± 0.327	3.306 ± 0.370	0.905 ± 0.371

- Used 1 um Au foil for measurements
- Achieved spot differences using quadrapole MQJ0L02



7335



7336



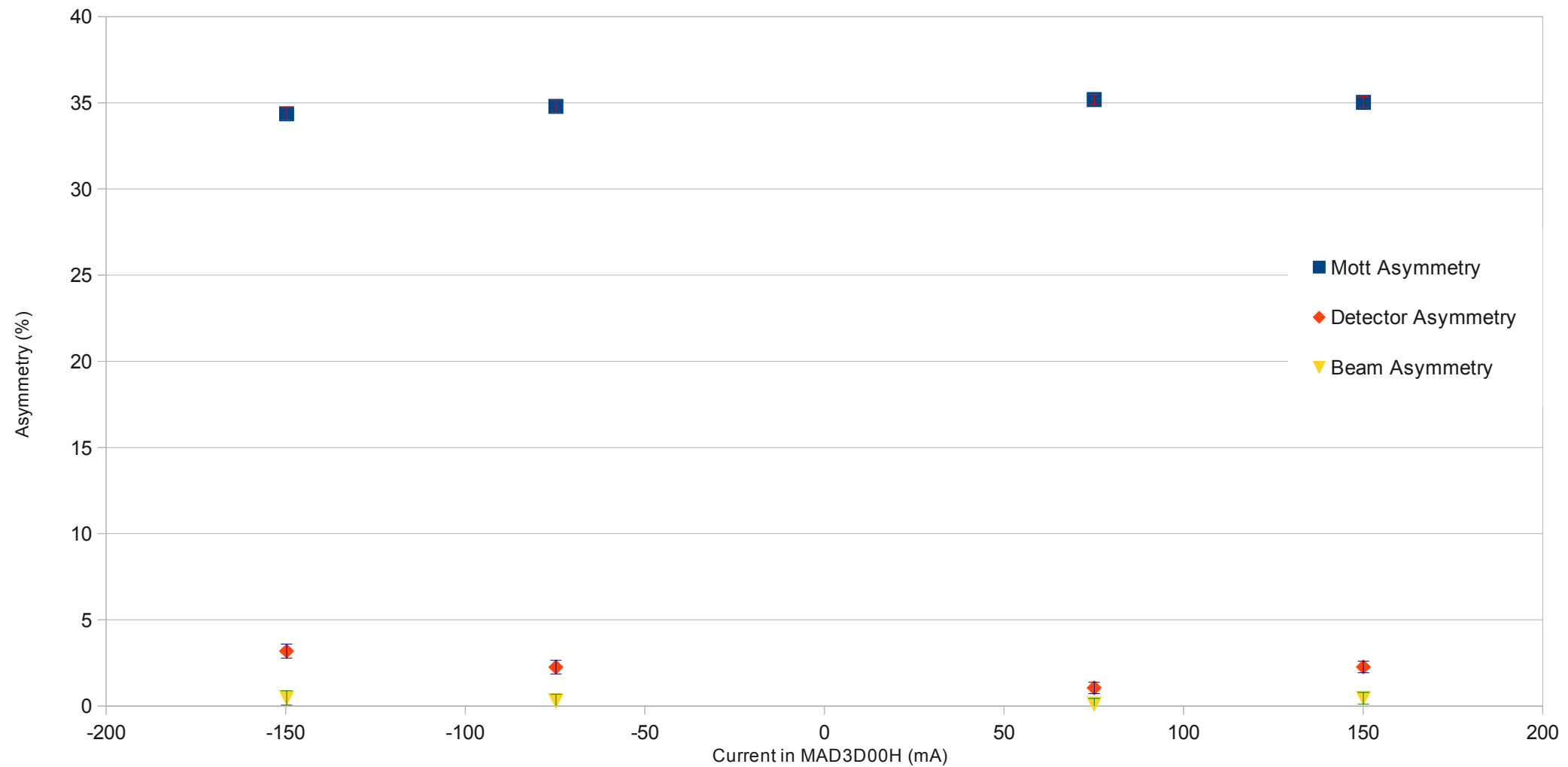
7337

Asymmetry versus Beam Position

150 mA deflection ~ 2 beam widths from center

Asymmetry versus Horizontal Kick

Vertical Corrector Zero Field 1 μm Au Foil



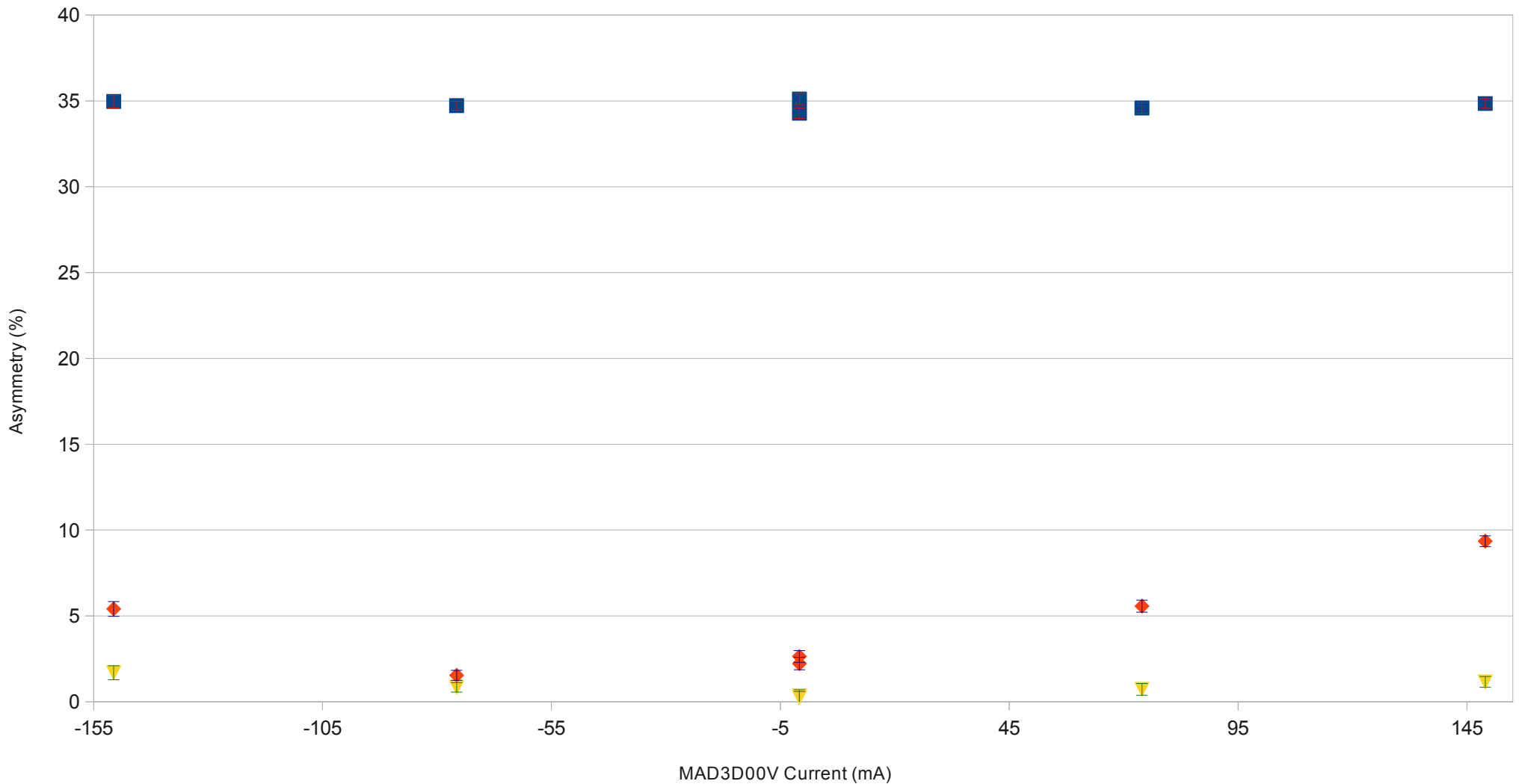
Asymmetry versus Beam Position

Asymmetry versus Vertical Kick

Horizontal Corrector Zero Field

1 μ m Au Foil

- Mott Asymmetry
- ◆ Detector Asymmetry
- ▼ Beam Asymmetry



Next Steps...

- **Asymmetry vs Beam Momentum** – Measurements of multiple foil thicknesses at various energies to extrapolate $S(0)$ from for comparison
- **Asymmetry vs Beam Position on Target** –
 - Convert from mA of current in correctors to XY position on target foil
 - Compare counting rates for different target positions
- **Other Studies** –
 - Asymmetry vs Beam Current / Counting Rates vs Beam Current
 - Asymmetry vs Dump Dipole currents – separately looking at Al and BeCu dumps

