

Hall A Møller Polarimeter after Upgrade

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What was done?

- 1. Polarized electron target "brute force" 3T (smaller thickness, lower heating)*
- 2. Segmented aperture detector (higher rate)*
- 3. Introduce a beam duty cycle (reduce heating, increase beam current)*
- 4. New fast DAQ based on FADC (higher rate, smaller dead time, more information etc.)*

Møller Polarimeter Layout

Hall A Møller Polarimeter Control

Beam Structure Control

MOELLER ON | Mizar Mode | Beam Sync | Normal Mode | Master Mode | Pulse Width Settings: 100.00 us, Duty Factor 0.00

MOELLER OFF | Pulse Mode | Beam Off | Status: Setting Accepted

Beam structure changes from this screen will only take effect if the Master Mode is in Expert. If Gun Master Mode is Normal these controls are disabled.

Solenoid Status: **PERSISTENT** | Moller Solenoid Field (Tesla): **1.5009** | Moller Superconducting Magnet (Gauss): **0.69499**

Target Motion Control

LINEAR
Current Status Position: **2.002** mm

Set Linear Position
Left Limit: Retracted (1, 2)
Right Limit: Extended (3, 4)
Jog: 0.500
Position Input: **57.000**

MOTOR STATUS: Move complete

MAGNET NAME	HYSTERESIS LOOP SWITCH	INTEGRATED FIELD SET POINT (GAUSS-CM)	CURRENT SETPOINT (amps)	CURRENT READBACK (amps)	SET Ramp Rate (Amps/sec)	POWER On/Off CONTROLS
MQM1H02	on/off	13081.000	76.008	75.59	6.0	POS on/off
MQO1H03	on/off	0.000	1.332	0.81	6.0	POS on/off
MQO1H03A	on/off	3357.030	21.494	20.79	6.0	POS on/off

MAGNET NAME	HYSTERESIS LOOP SWITCH	INTEGRATED FIELD SET POINT (Gauss-Cm)	INTEGRATED FIELD SET POINT (Gauss-Cm)	CURRENT READBACKS (Amps)	MAIN POWER CONTROLS
MMA1H01	on/off	1 303701.000	2 0.00000	3 68.00778 67.887	On Off/Reset

MQM1H02

MQO1H03

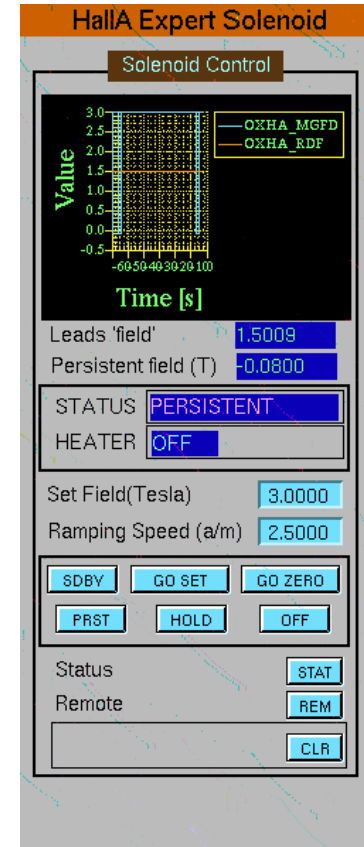
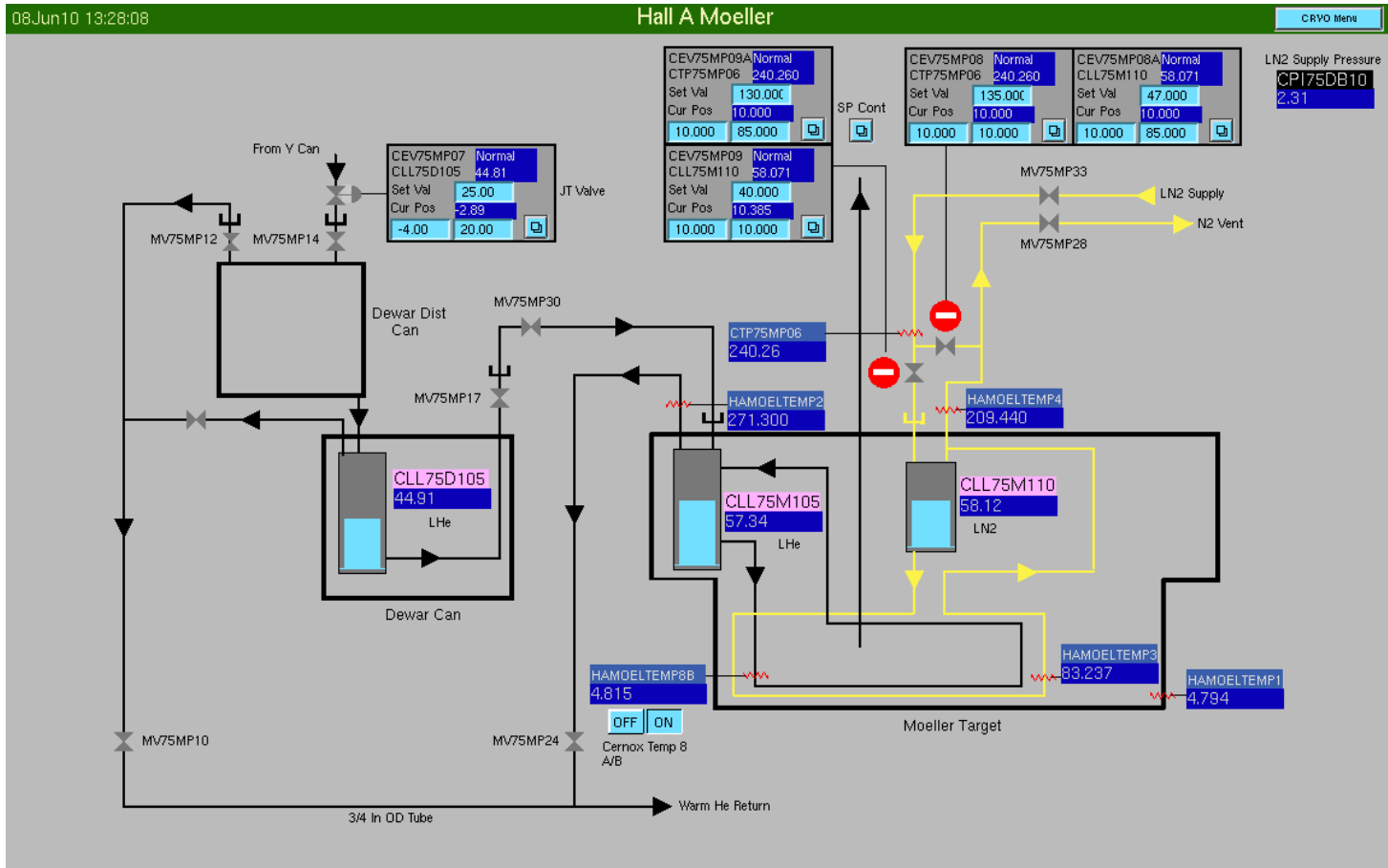
MQO1H03A

MMA1H01

Striptool

"EXPERT" mode - polarization measurement with the beam current up to $10\mu\text{A}$

Møller Superconducting Magnet

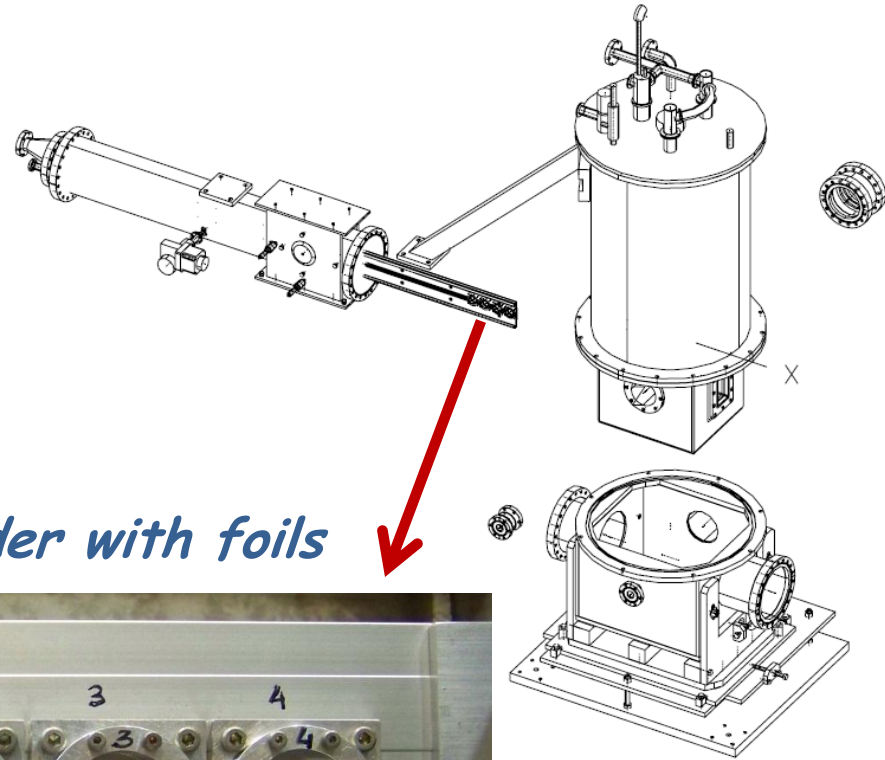
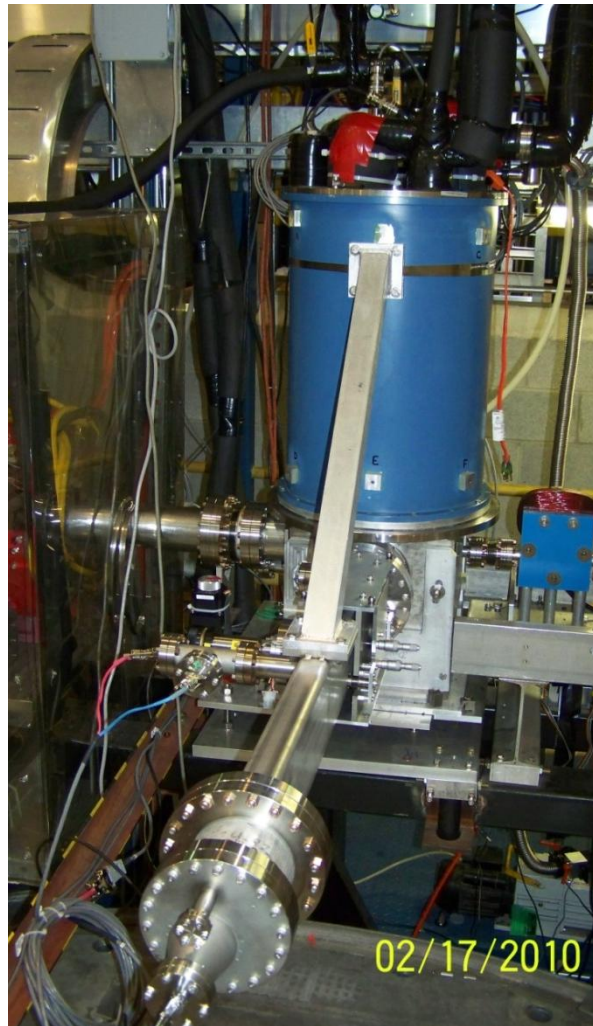


Working very stable

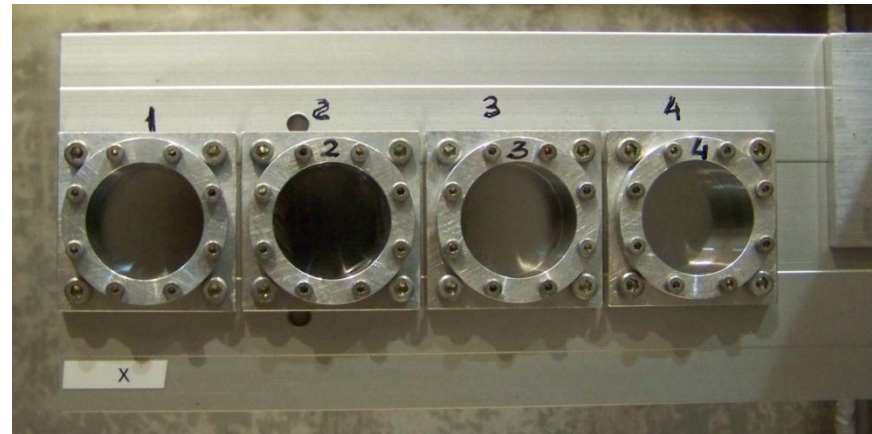
Alignment test:

$X = -0.2\text{mm}$ $Y = -1.7\text{mm}$ Horiz = -1.6mrad Vert = $+6.1\text{mrad}$

New Møller Target



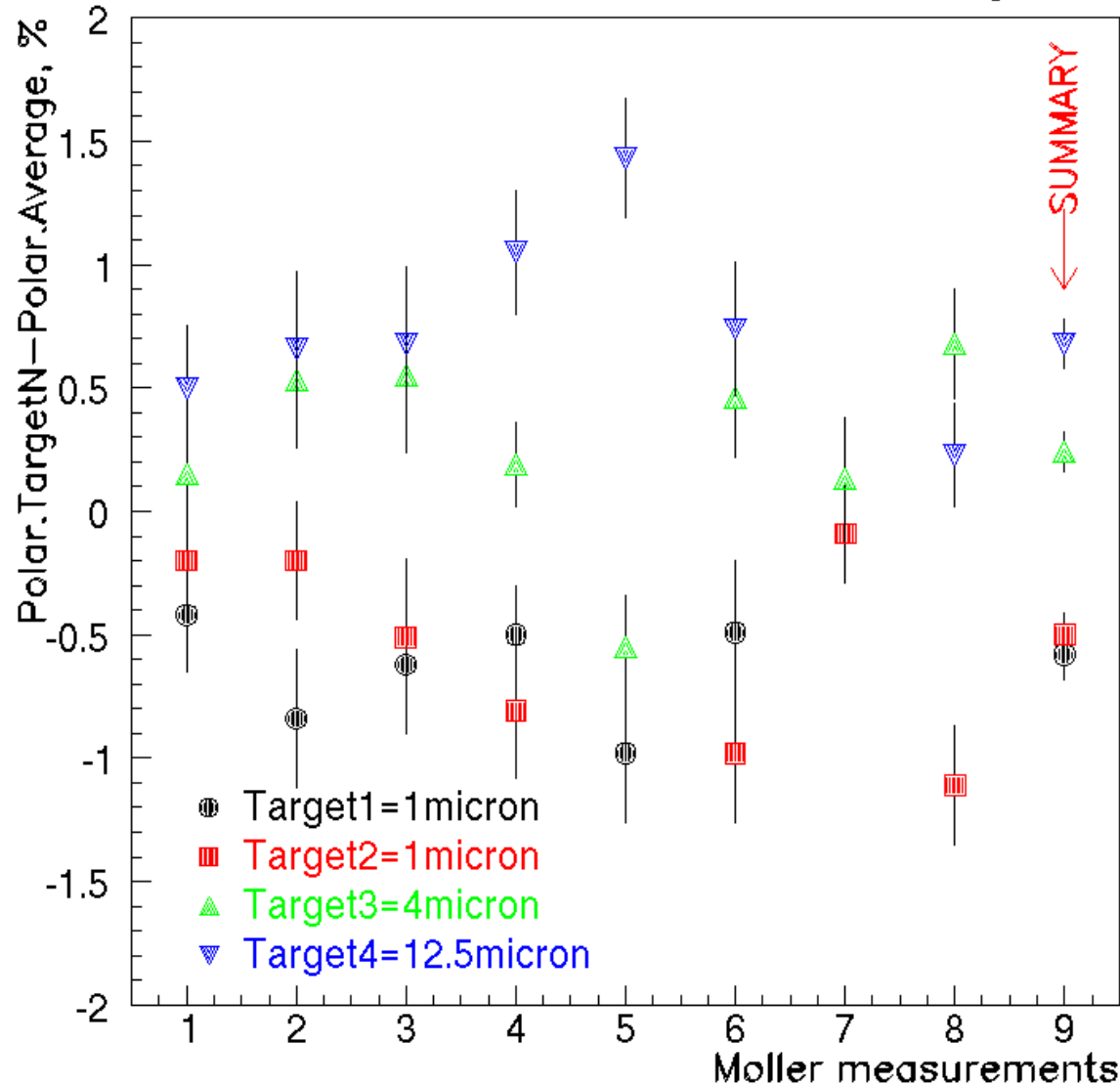
Target holder with foils



Targets: Fe(99.85%) foils **1**-1 μ m, **2**-1 μ m, **3**-4 μ m, **4**-12.5 μ m

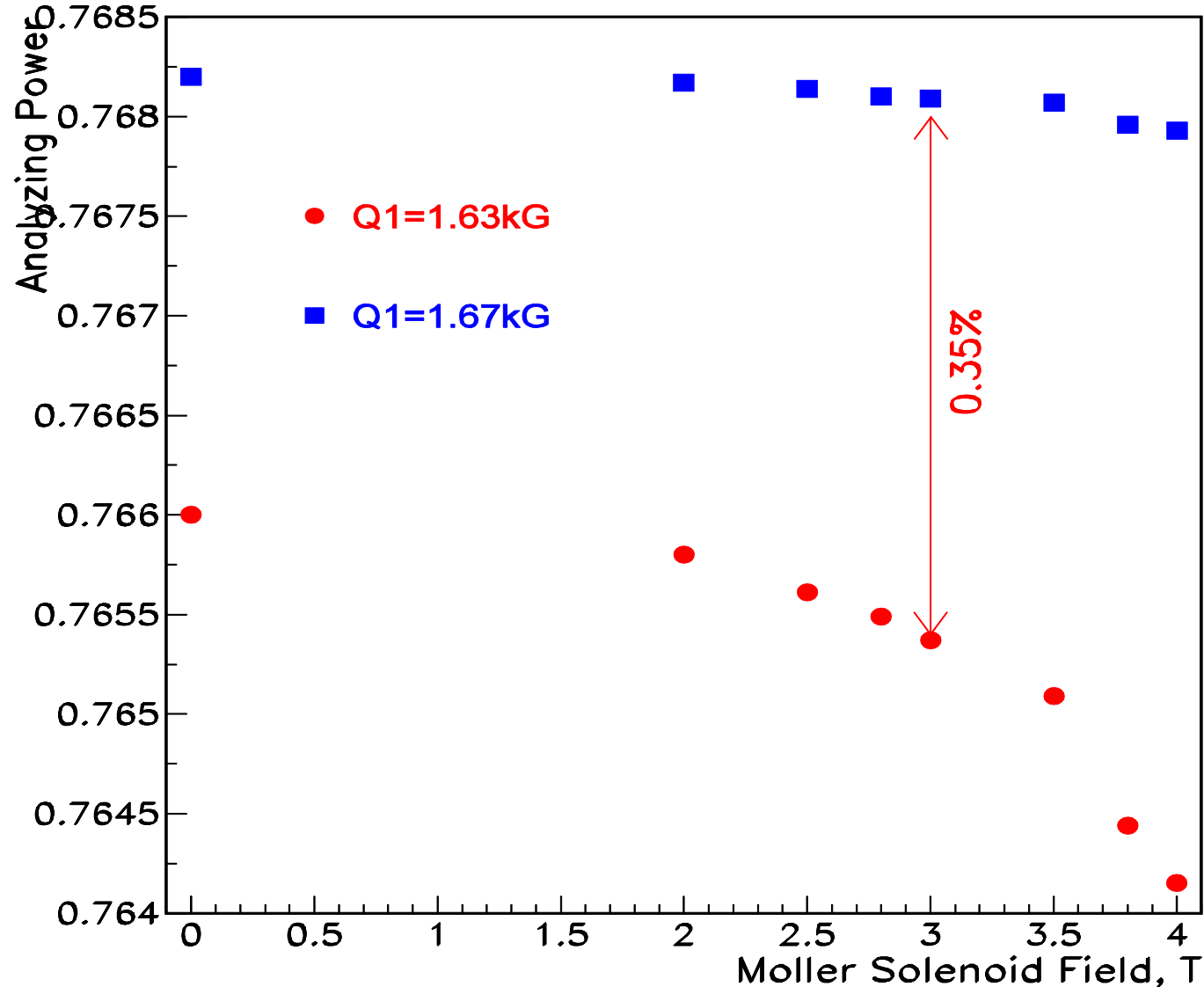
Møller Target Systematic Error

Beam Polarization vs. Moller Target

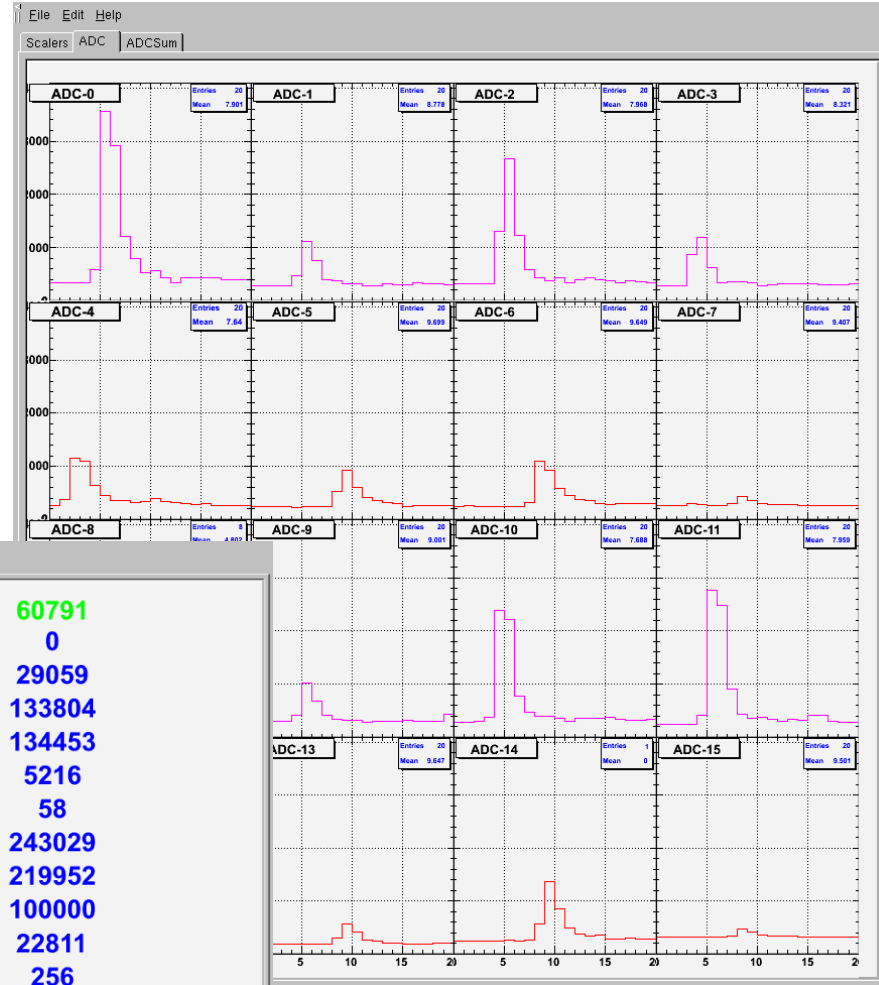
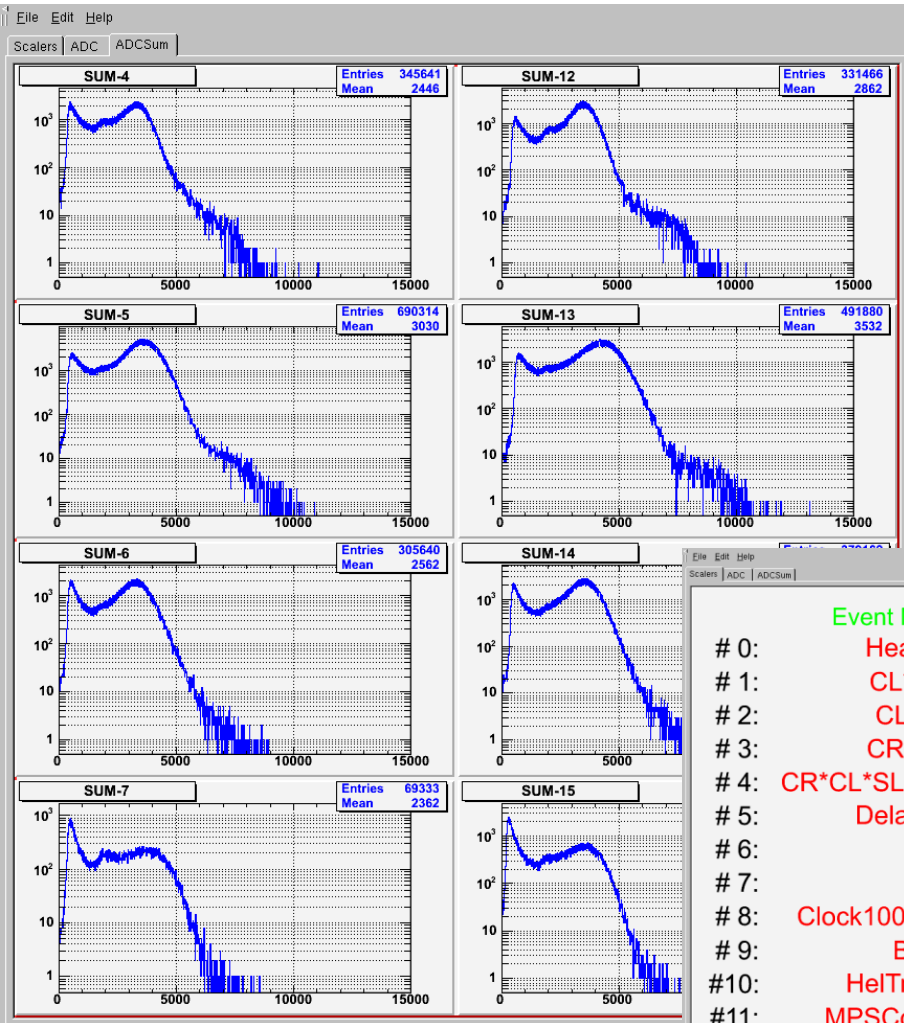


Møller Polarimeter Analyzing Power

MOLLER ANALYZING POWER vs. SATURATED FIELD



On-line FADC monitor



Event Num: 60791

# 0:	Header:	0
# 1:	CL*CR:	29059
# 2:	CL*SL:	133804
# 3:	CR*SR:	134453
# 4:	CR*CL*SL*SR:	5216
# 5:	Delayed:	58
# 6:	CL:	243029
# 7:	CR:	219952
# 8:	Clock100kHz:	100000
# 9:	BCM:	22811
#10:	HelTrans:	256
#11:	MPSCount:	828
#12:	ADCGate:	6310371
#13:	Channel5:	3356
#14:	Channel6:	827
#15:	Channel7:	0

"TO DO" LIST

Magnet:

New alignment

Fix small software bugs

Remotely controlled LHe magnet filling

COLD RETURN LINE

Target:

Replace foils Fe 99.85% -> 99.99%

12.5 μm -> 10 μm

Analyzing power:

Test Q1 (the first Møller quad)

Old DAQ:

Upgrade discriminator and PLU

FADC:

Improve analyzer

Improve analysis

SYSTEMATIC ERROR $\leq 1\%$