

RESULTS
the
MØLLER POLARIMETER
STUDIES

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WHAT'S NEW?

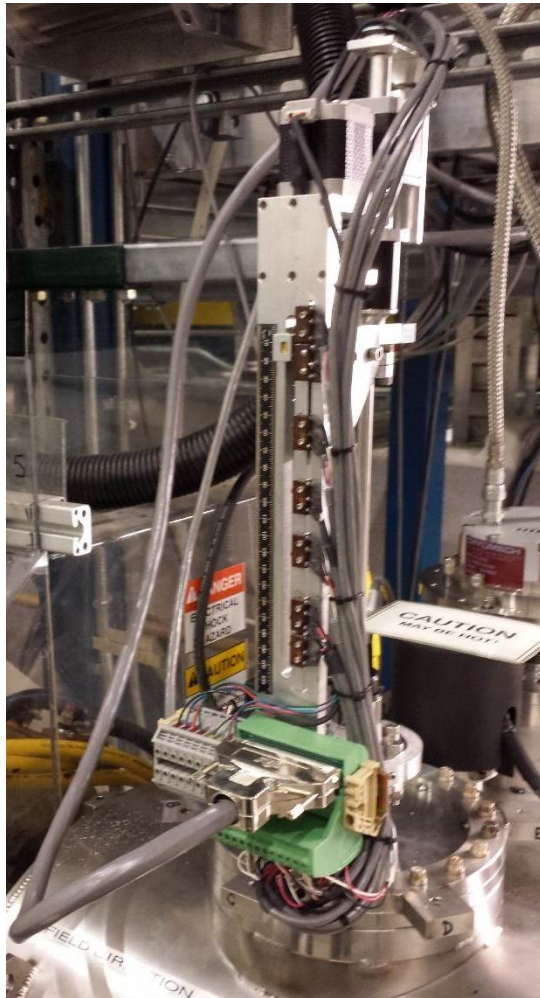
New SC magnet

New target

Five measurements + 1 test:

- 18-20 December, 2015 - 11 GeV
- 17 February, 2016 - 4.48 GeV
- 19 February, 2016 - beam charge asymmetry test, 4.48 GeV
- 29 February, 2016 - spin dance, 8.82 GeV
- 31 March, 2016 - 10.99 GeV
- 19 April, 2016 - with Compton chicane, 10.99 GeV

NEW POLARIZED ELECTRON TARGET



Hall A High-Field Moller Target Motion Control

Linear

Motor Readback (mm) **0.000** Encoder (v) **3.031**

Position (mm)	0	43.444	80.265	117.483	155.298
Encoder (v)	3.025	2.364	1.813	1.251	0.680

Retracted **Park** T1 T2 T3 T4 Extended

P T1 T2 T3 T4 Move

0.000 < 0.000 > STOP

Position Input (mm) Jog (mm)

Rotary

Motor Readback (degree) **-0.112** Encoder (v) **4.568**

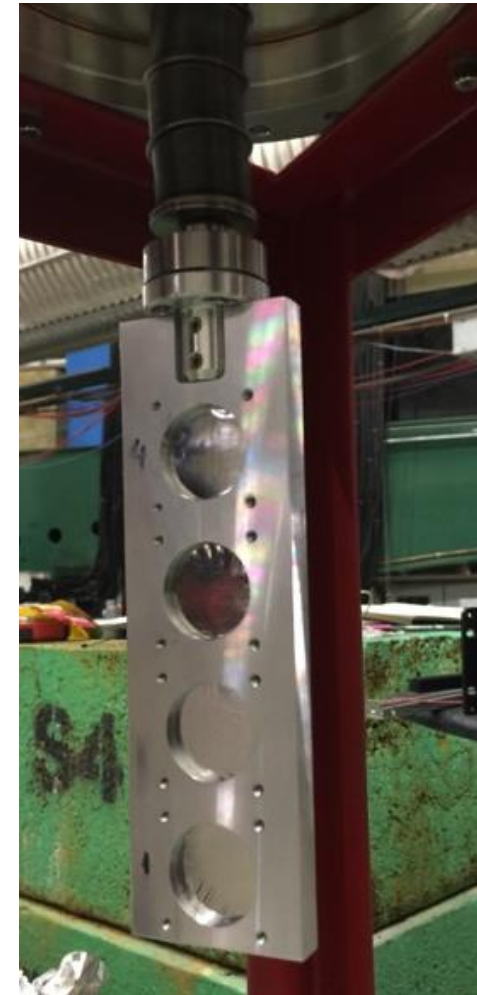
Position (degree)	-8.426	-0.200	12.865
Encoder (v)	4.150	4.558	5.206

-Limit **C** +Limit

-L C +L Move

-0.112 < 0.000 > STOP

Position Input (degree) Jog (degree)



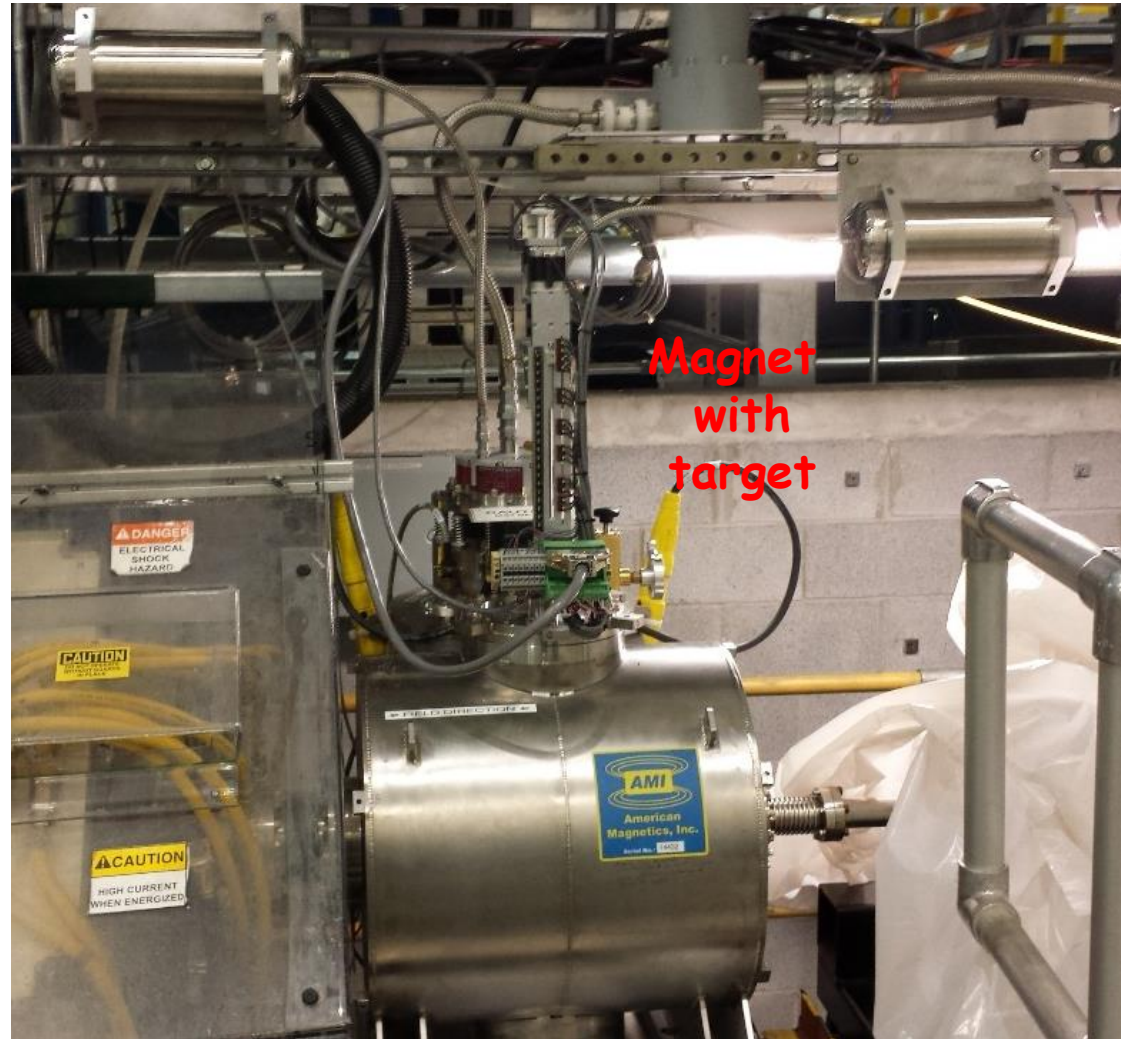
Designed and made by Temple University

Rotation in horizontal plane $\pm 10^\circ$

Vertical translation

Targets in holder: pure iron $1\mu\text{m}$, $4\mu\text{m}$, $12\mu\text{m}$, $25\mu\text{m}$

NEW MAGNET



New superconductive magnet:

Maximal field $\pm 5T$

- portable

- no LN required

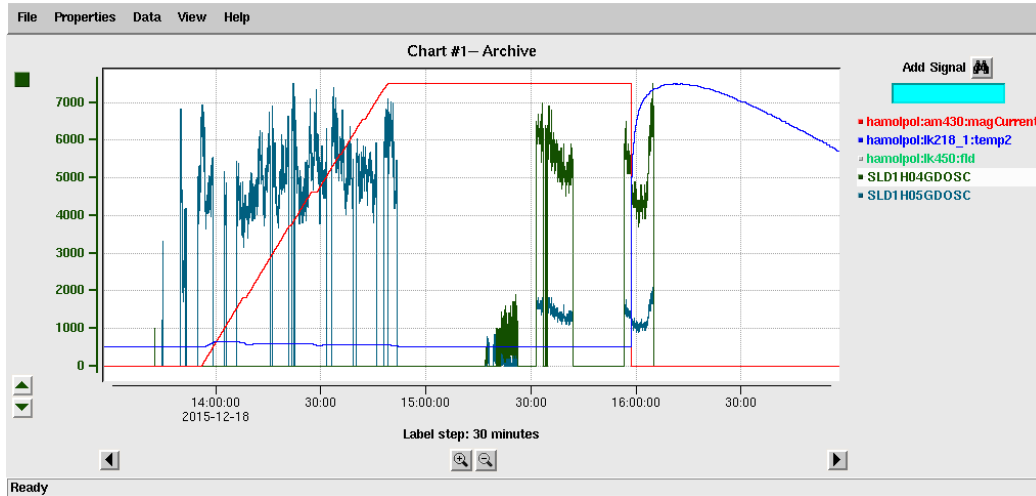
- no cryo lines required

Small amount of He \rightarrow

- low thermal capacity and “cold” production \rightarrow

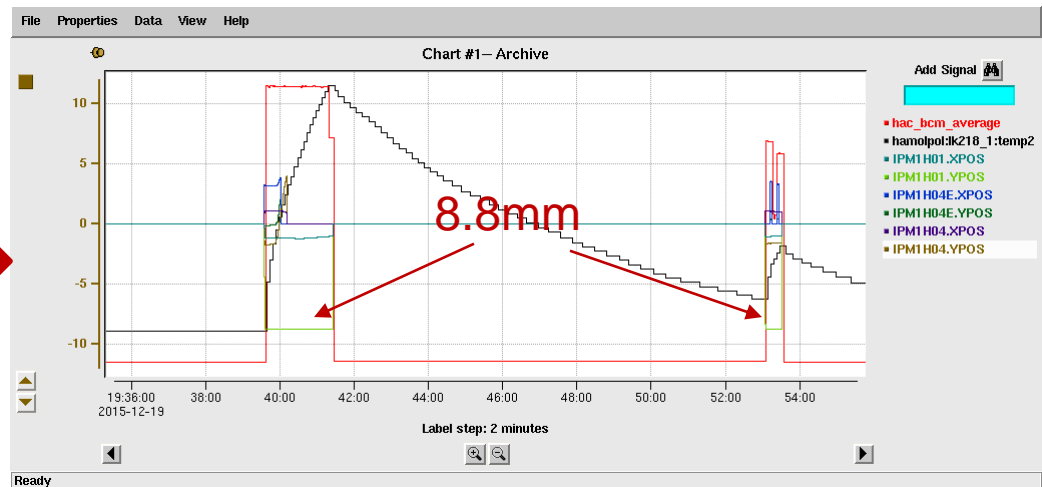
- slow field ramp-rate ($\sim 35\text{min}: 0 \rightarrow 3T$)

FIRST EXPERIENCE WITH OPERATION



*18 December, 2015
CW beam 1.5 μ A
4T field in magnet
Target #3 (12 μ m)
Magnet QUENCH -
5-6 hours to recovery*

*19 December, 2015
Beam through Compton
Pulse/Tune
Low radiation
No field in magnet
No Moller target*



EXPERIENCE WITH MAGNET OPERATION

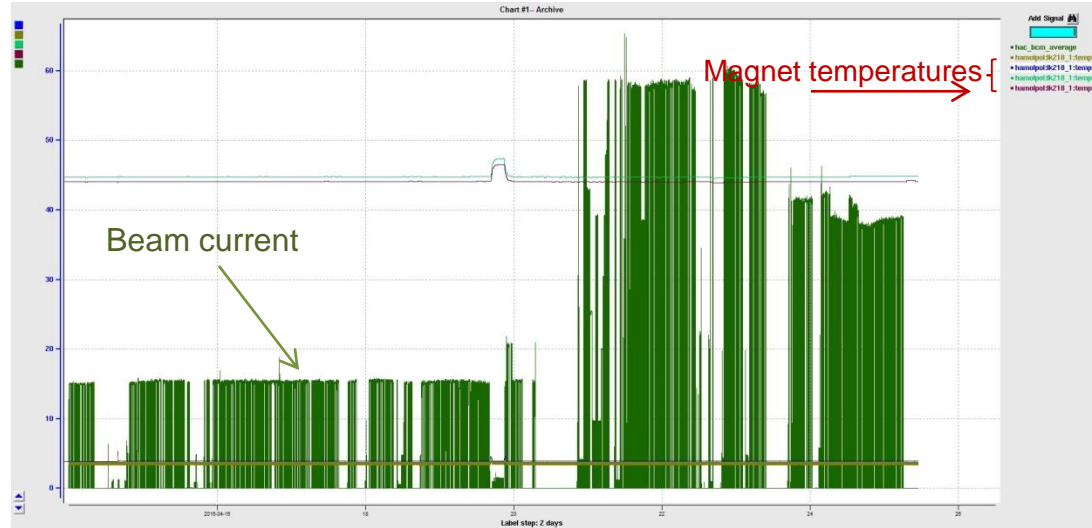
Magnet can be used at high beam current and high radiation in Hall A

04/19/2016 – First Moller measurement with beam through the Compton chicane (11GeV)

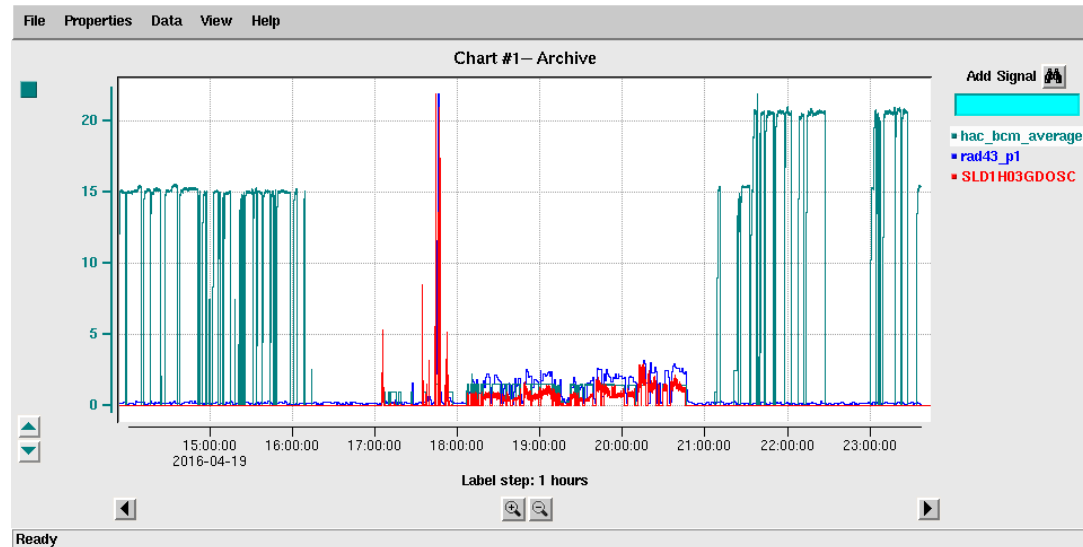
High radiation:

- *Hall A target in “EMPTY” not at “HOME”;*
 - *Optics combined with Compton;*
 - *Combination of all above.*
- Will be checked in the fall run.*

Magnet alignment test at low beam energy is needed.

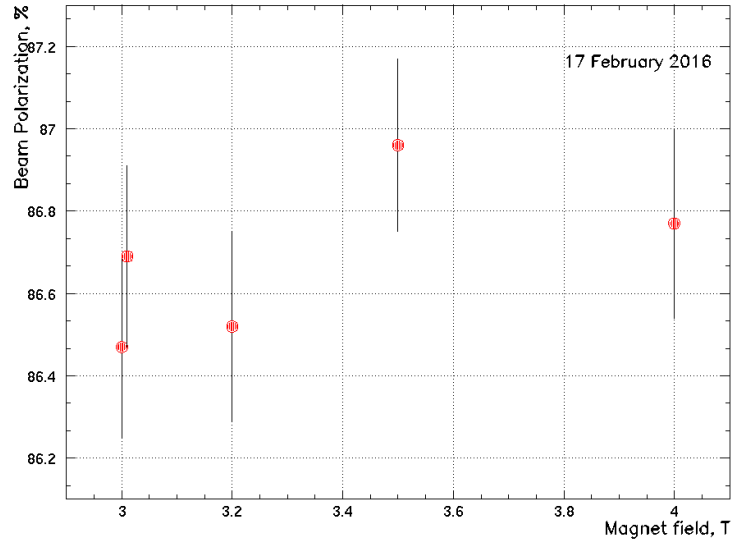


Rad43_p1 – Hall A track ramp (up to 0.9 mrem/h)
SLD1H03GDOSC – target ion chamber (up to 50 rad/h)

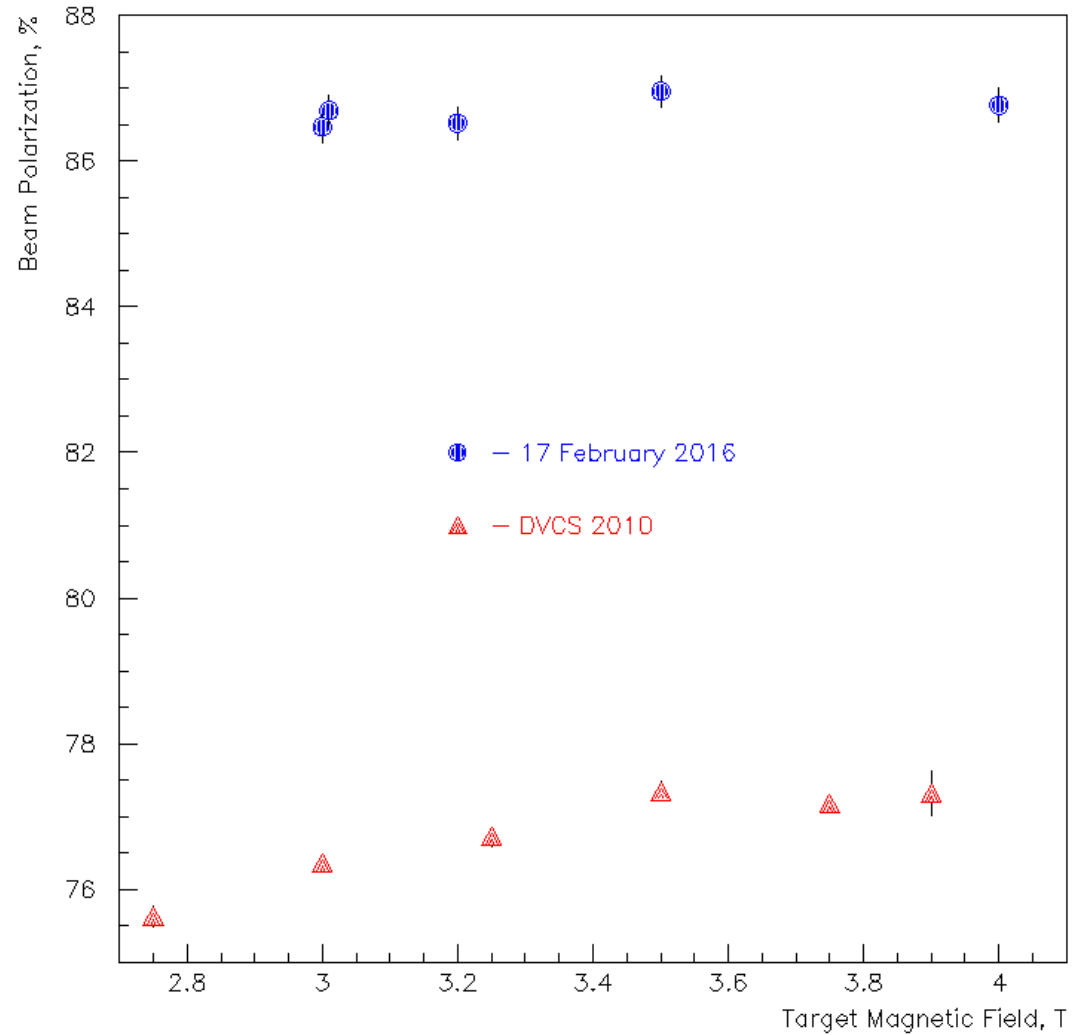


NEW TARGET SATURATION TEST

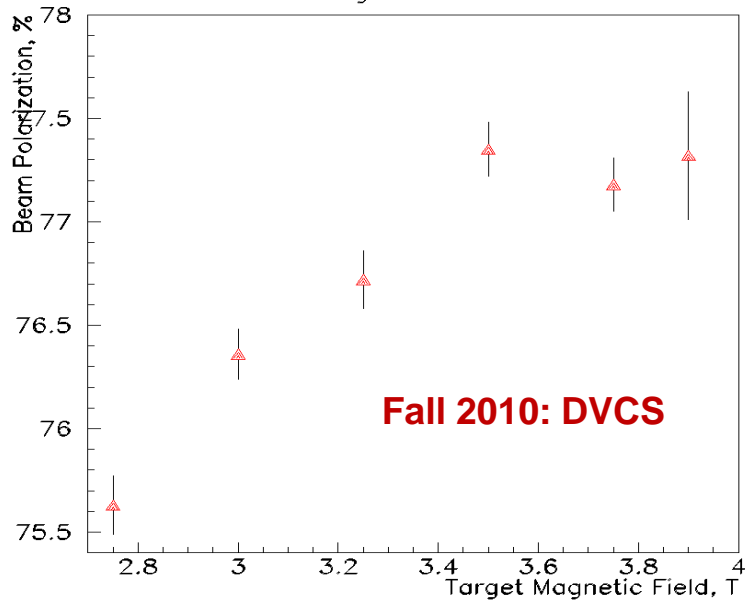
Measured Polarization vs. Target Saturation Field
Moller Polarimeter



DVCS Target Saturation Test



DVCS Target Saturation Test

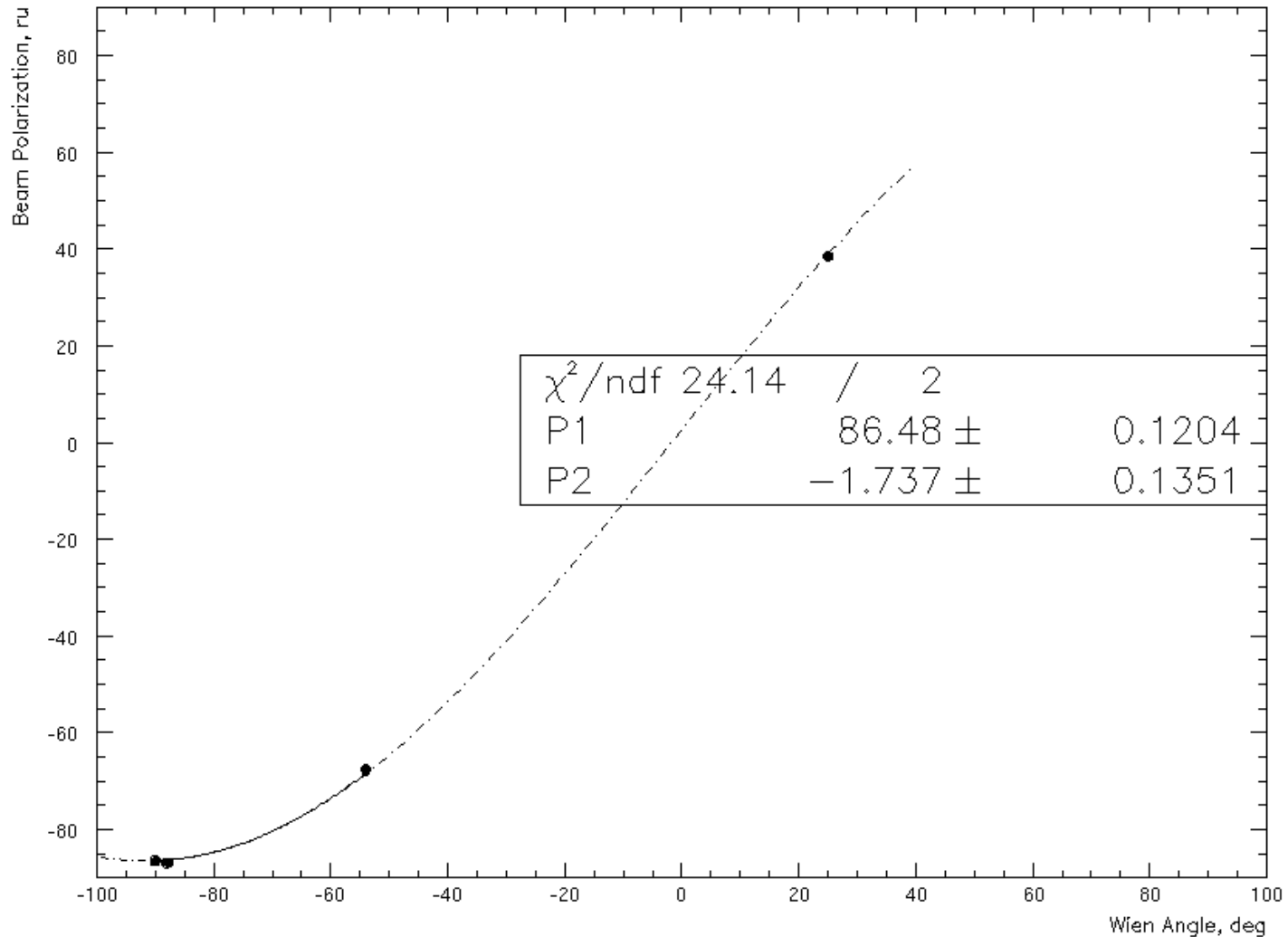


Fall 2010: DVCS

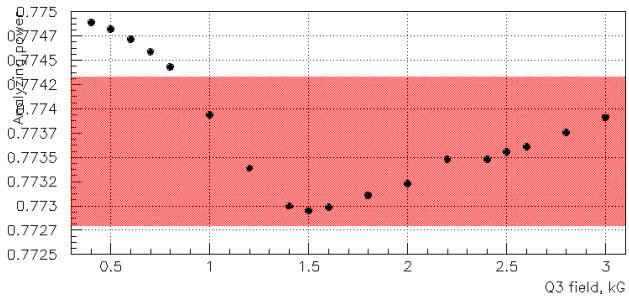
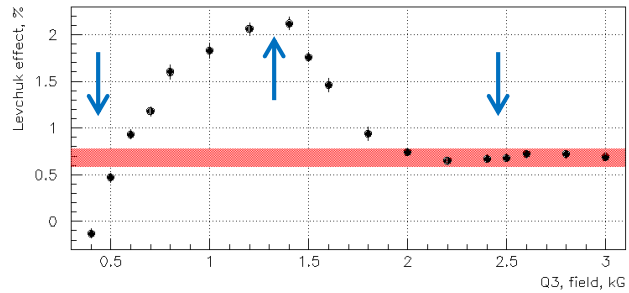
SPIN DANCE

Moller results for Spin Dance 02/29/2016

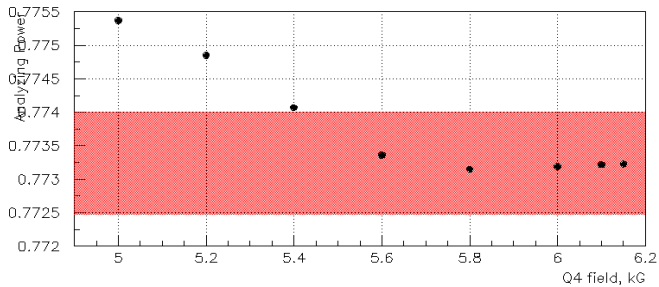
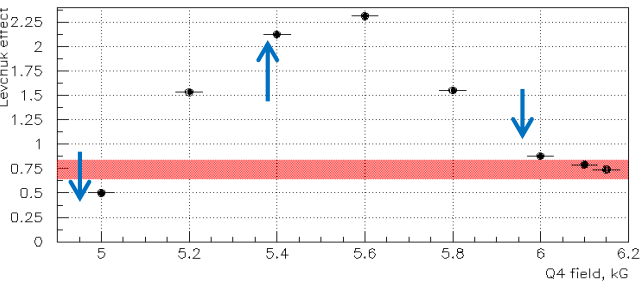
Moeller run=16009



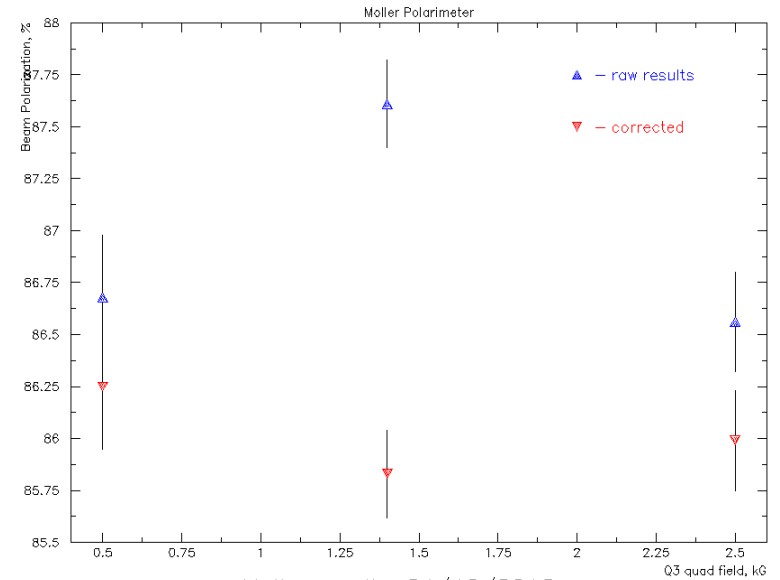
GEANT vs. MEASUREMENT SYSTEMATICS



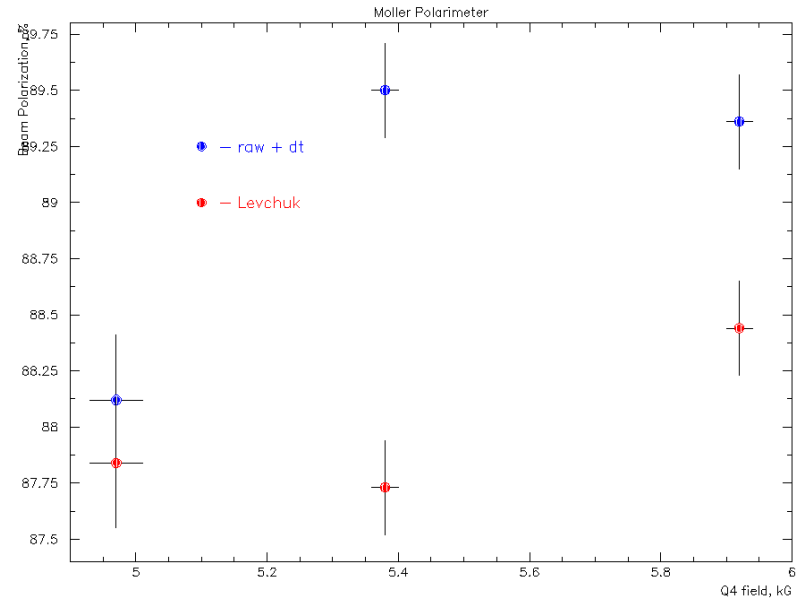
$E_b = 11\text{GeV}$



Moller results, 03/31/2016



Moller results, 04/19/2016



MORE SYSTEMATICS

Dead time:

- can estimate it with using LED pulser*

To do list:

- Target improvement;*
- Background (GEANT);*
- Rad. corrections;*
- Fe vs. Co and Ni;*
- Kerr effect to study target alignment.*