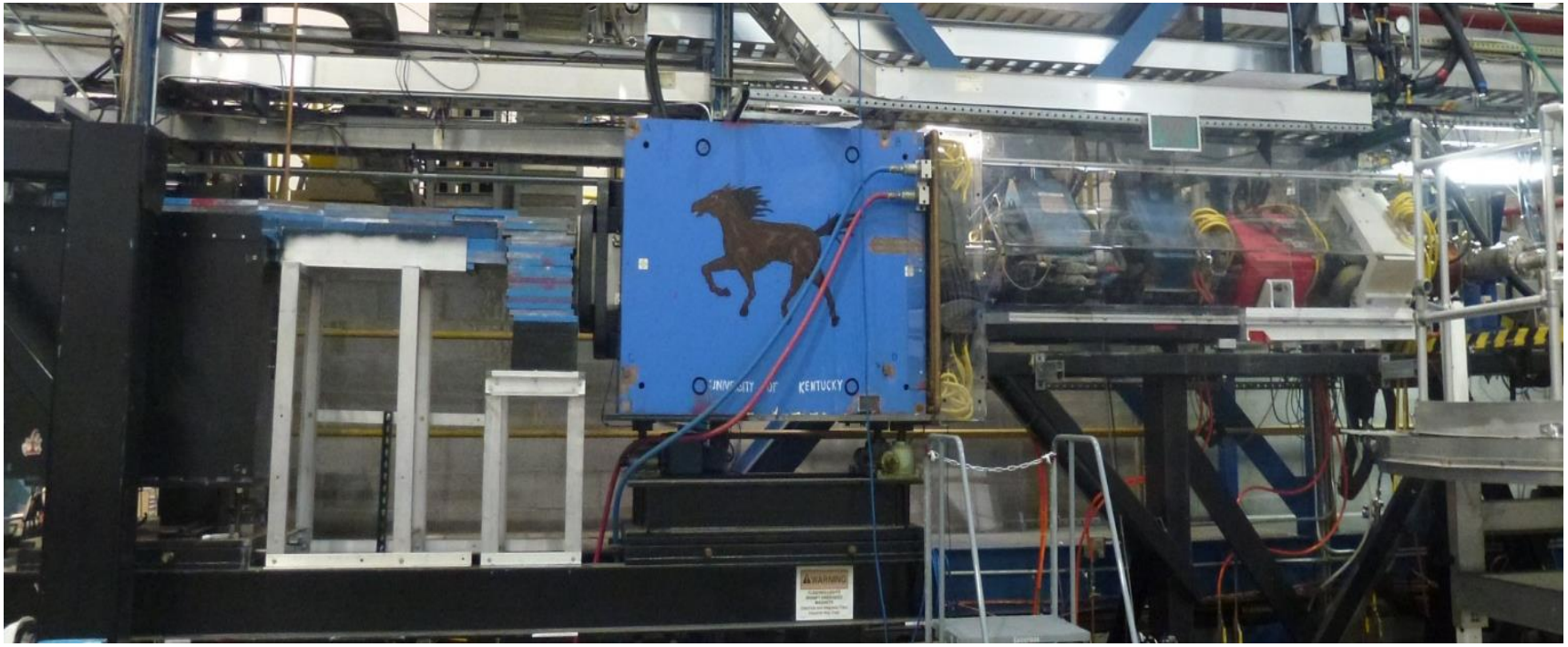
Results from the Møller Polarimeter Studies

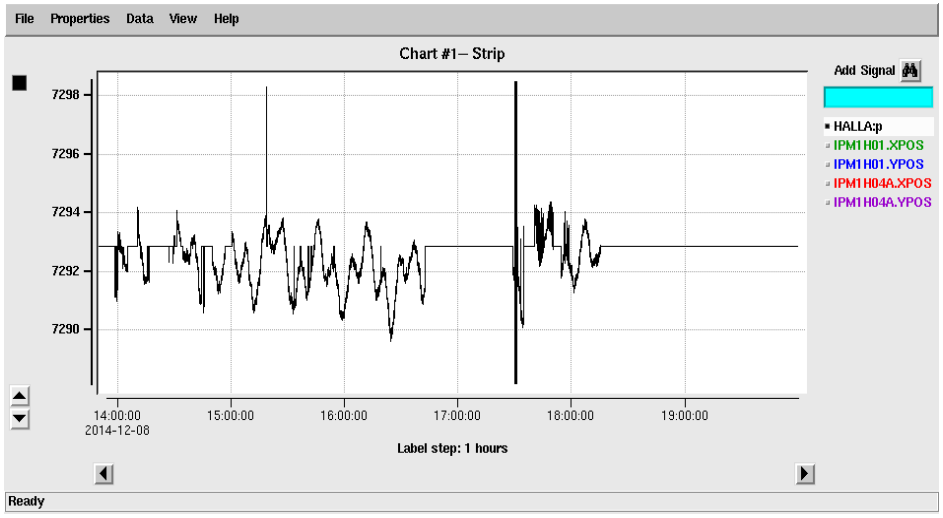


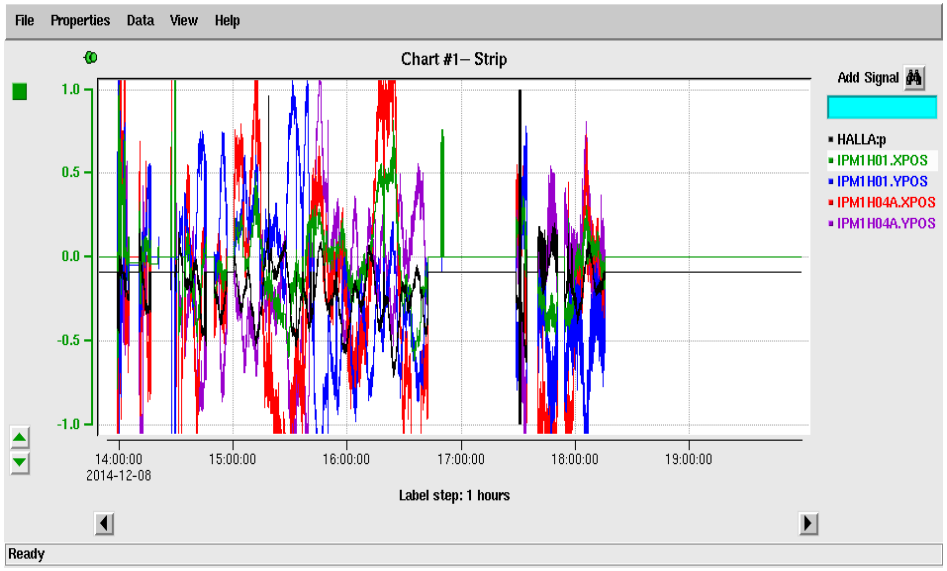
O. Glamazdin, R. Pomatsalyuk

Møller Run on December 8, 2014

Beam energy 7.375GeV – new beam energy era.

- Tune HV
- Poor energy and beam position condition (no systematic studies)
- Did not finish the measurements because of the beam lost
- Prove that the Moller polarimeter can work at the beam energy more than 6GeV (new era)

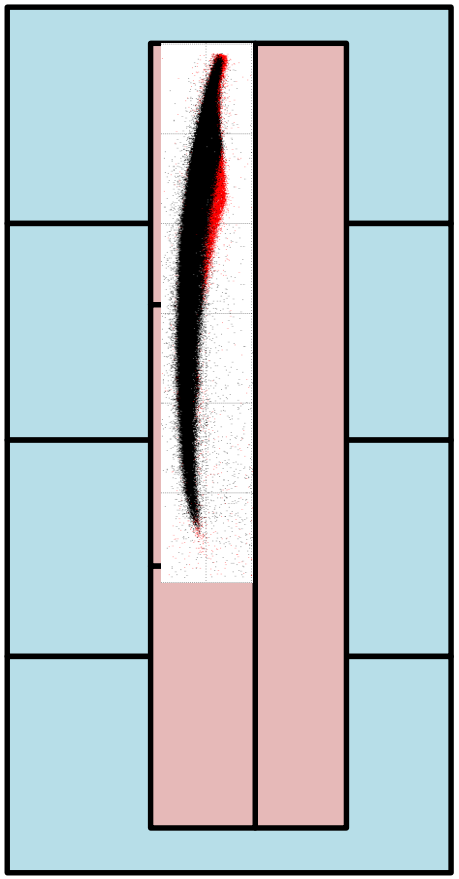




Møller Run on March 15, 2015

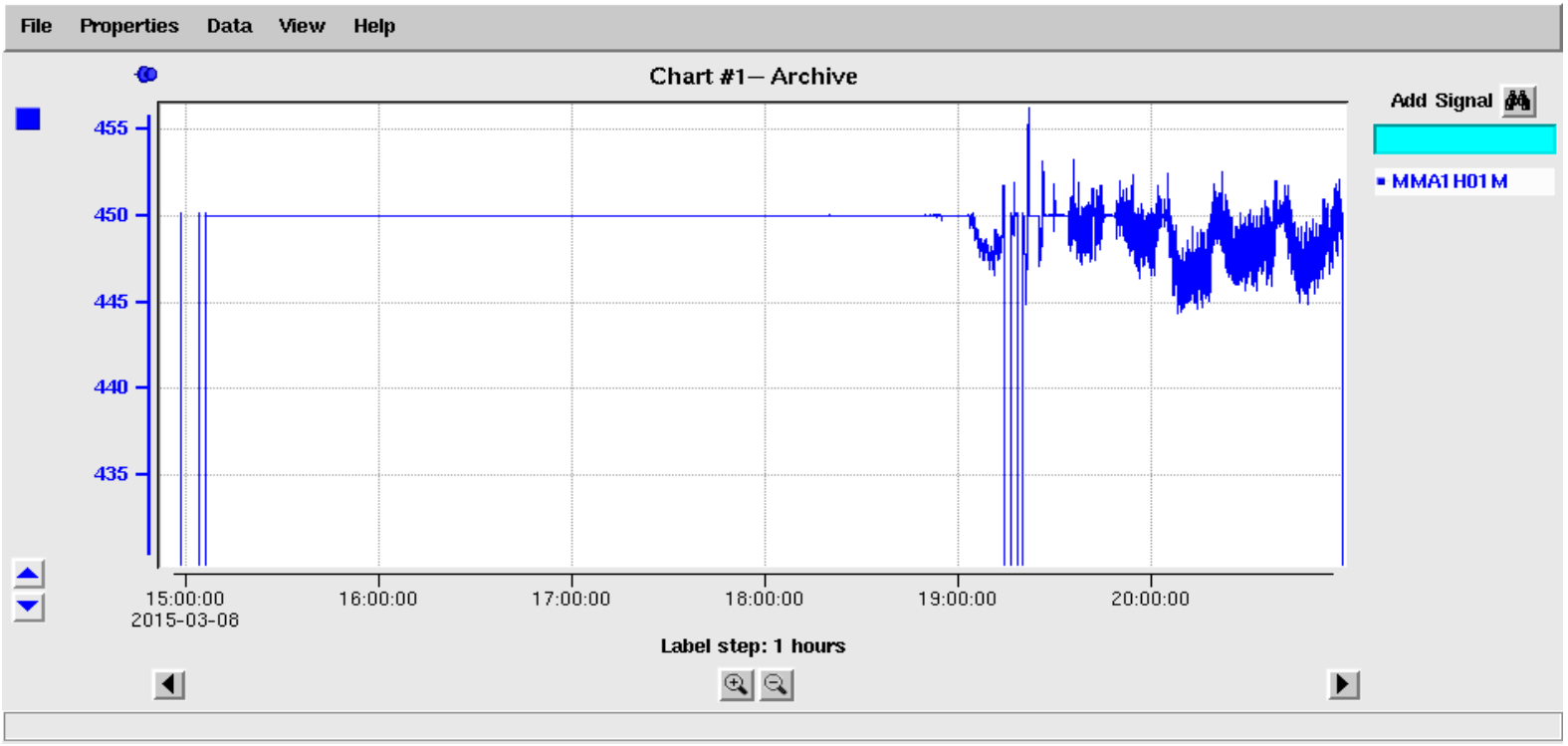
Beam energy 9.573GeV

- Poor energy and beam position stability
- Tune HV
- Tune detector thresholds
- Compare GEANT and measurements for new aperture detector geometry
- Dipole power supply problem



run	Left	Right	**Coinc.**	Accid.	BCM	Clock	Cor.Asymm	Polarization	angl	An.Pow	Pol.Targ	PolarizationL/R	Asym BCM	coil	Factor
15695	147173	96928	**31005**	271.	28487.	101757	0.0479+/- 0.0004	0.8252+/- 0.0066	19.95	0.7707	0.0801	0.6081	0.6441	0.00213	0.00004	-16.0	17.237
15696	146021	96217	**30344**	266.	28531.	101748	-0.0486+/- 0.0004	-0.8373+/- 0.0067	19.95	0.7707	0.0802	-0.6178	-0.6547	0.00214	0.00004	15.2	17.221
15697	159702	140004	**33228**	417.	28606.	101739	0.0478+/- 0.0004	0.8254+/- 0.0066	19.95	0.7707	0.0800	0.5505	0.5162	0.00221	0.00007	-16.0	17.265
15698	159008	139628	**33173**	415.	28460.	101757	-0.0476+/- 0.0004	-0.8194+/- 0.0064	19.95	0.7707	0.0803	-0.5524	-0.5235	0.00217	0.00011	15.2	17.197
15699	135695	91995	**29350**	240.	28624.	101795	0.0478+/- 0.0004	0.8225+/- 0.0068	19.95	0.7707	0.0802	0.6155	0.6533	0.00214	0.00006	-16.0	17.220
15700	134959	91653	**29027**	237.	28618.	101838	-0.0485+/- 0.0004	-0.8359+/- 0.0068	19.95	0.7707	0.0801	-0.6292	-0.6656	0.00213	0.00004	15.2	17.224
15701	134810	91613	**28919**	237.	28656.	101846	0.0481+/- 0.0004	0.8285+/- 0.0069	19.95	0.7707	0.0801	0.6186	0.6514	0.00218	0.00004	-16.0	17.235
15702	134991	92231	**29012**	240.	28721.	101850	-0.0481+/- 0.0004	-0.8274+/- 0.0069	19.95	0.7707	0.0803	-0.6298	-0.6581	0.00209	0.00004	15.2	17.200

Møller Dipole Power Supply

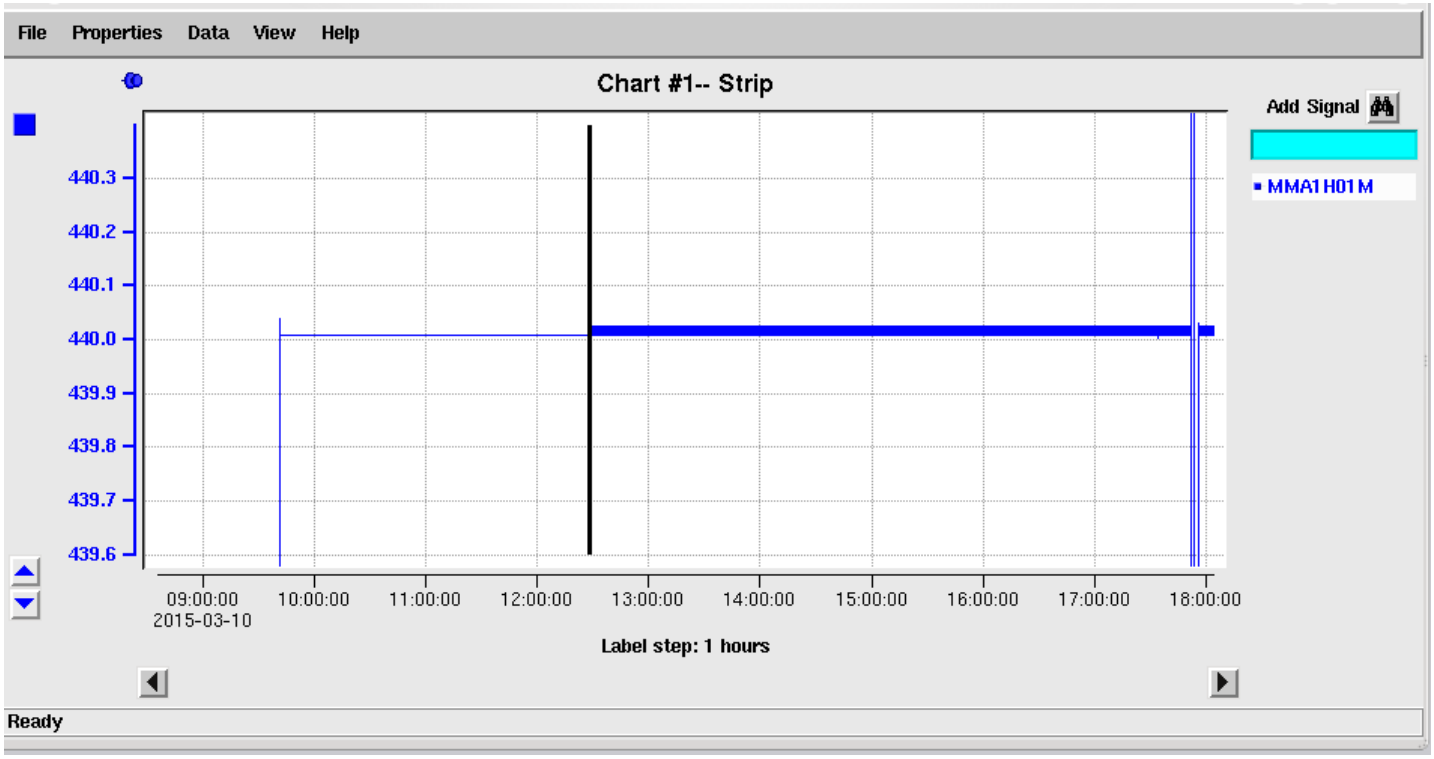


*0.0.2 Dipole bending angle

The present Møller electrons bending angle in the dipole is 10^0. A dipole current of about 700 A and a field of about 19.2 kGs is needed to keep this bending angle at 11 GeV. The maximal magnetic field measured in this dipole in Los Alamos was 17.5 kGs. The present dipole power supply provides the maximal current of 550 A which is enough for the beam energy of about 8 GeV and the bending angle of 10^0. This limitation, along with the problem of shielding the beam area at high fields, described below, demands a change in the bending angle. We propose to reduced the bending angle from 10^0 to 7.3^0.

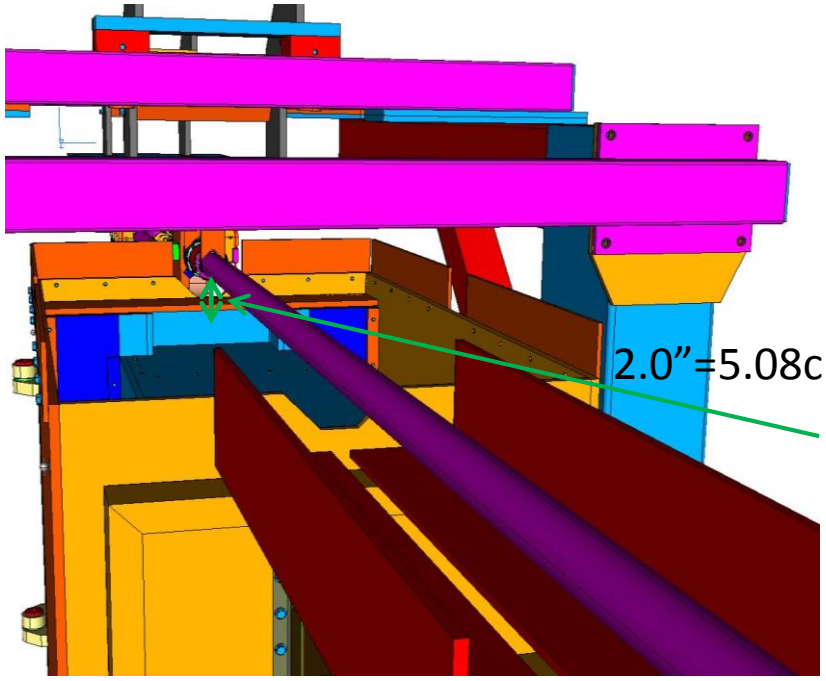
* A.Glamazdin, E. Chudakov "Moller polarimeter upgrade for 11 GeV", December 2000.

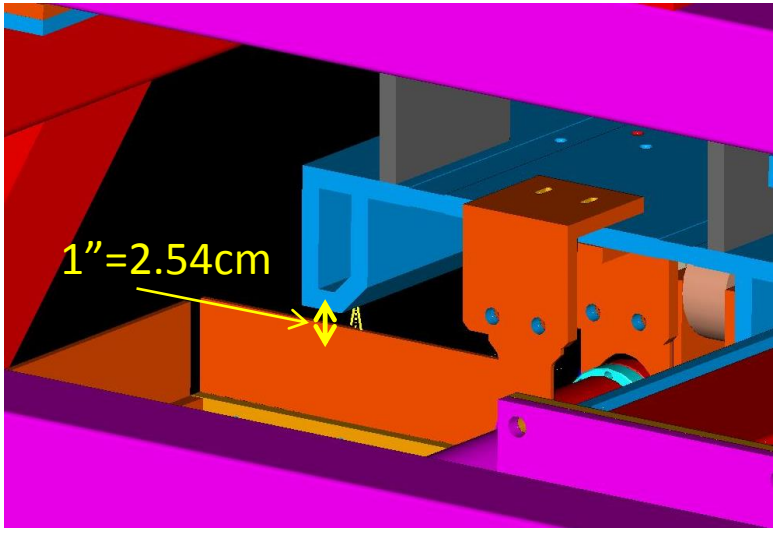
Møller Dipole Power Supply

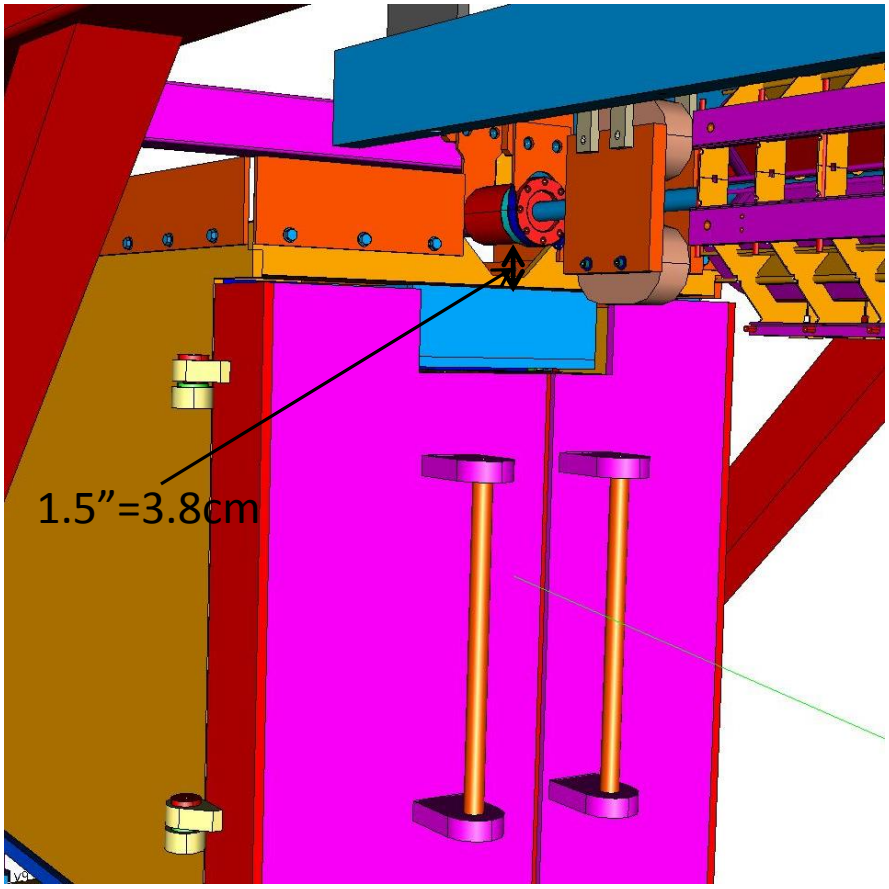


Hall A Moller polarimeter dipole stable at 440A
Lognumber 3325107. Submitted by benesch on Tue, 03/10/2015 - 18:10.
Last updated on Tue, 03/10/2015 - 18:11
Logbooks: ELOG HALOG
Entry Makers: benesch
Turned on at 440 A at 0941 at my request. Thin line is archiver data. Thicker line is strip chart data showing actual current variation is under 20 mA out of the 440A, perhaps 40 ppm. The power supply is fine at this current and not fine at 453A as discovered over the weekend. The vertical lines at the right are likely the supply being cycled. The vertical scale is 440 A +- 0.4A, a bit under 0.1% of magnet current. If funds are not available for a new supply, I suggest the polarimeter detectors be raised so 440A directs electrons at (11 GeV)/2 at the detectors if the hardware permits.

Detector Lift Up to Fix the Problem







- Lift up the detector shielding box on 3.5cm.
- Replace/cut border plank on the back top of the shielding box.
- Operate the dipole power supply with 440A at 11GeV beam energy.

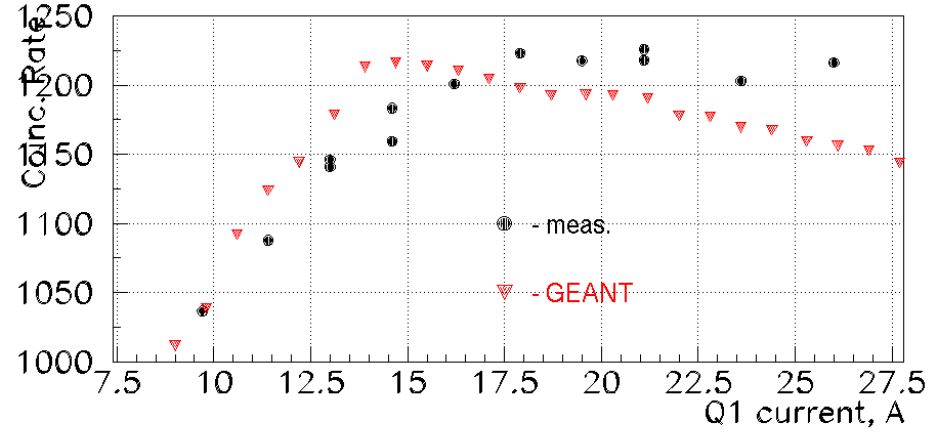
Møller Run on April 23-24, 2015

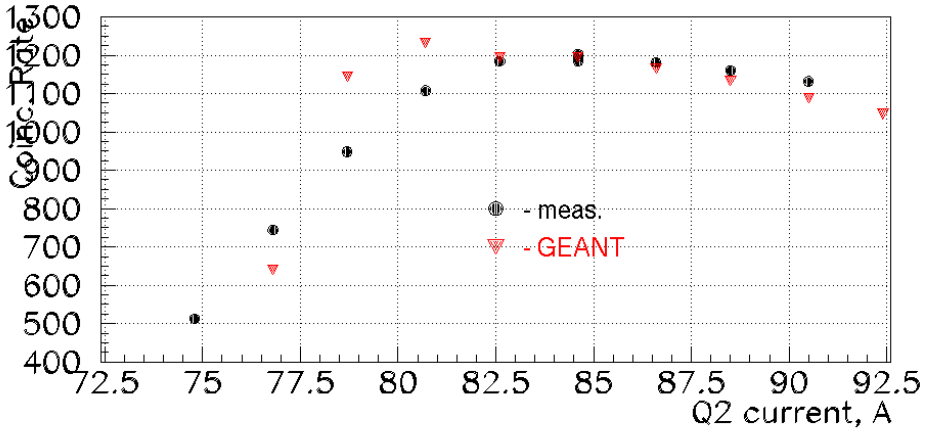
Beam energy 2.056GeV

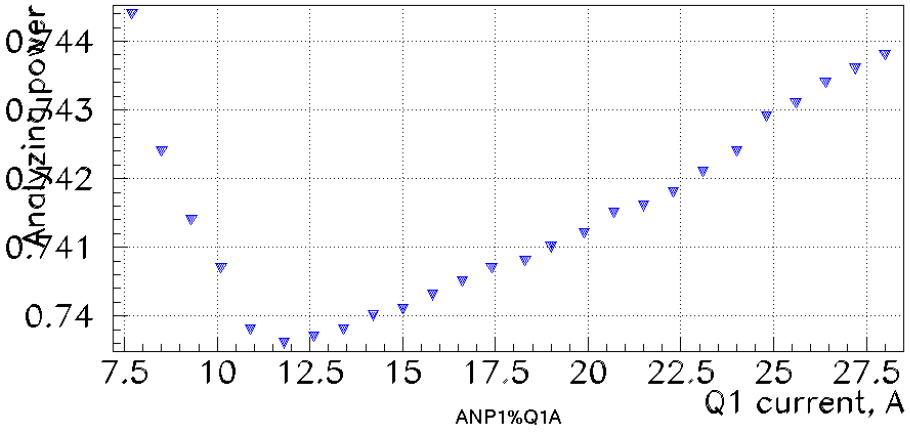
- Beam energy and position stability was good
- Enough time for systematic studies
- Study and tune of the aperture detector threshold and delays
- Quads and dipole scan
- Levchuk-effect study
- Dead time study

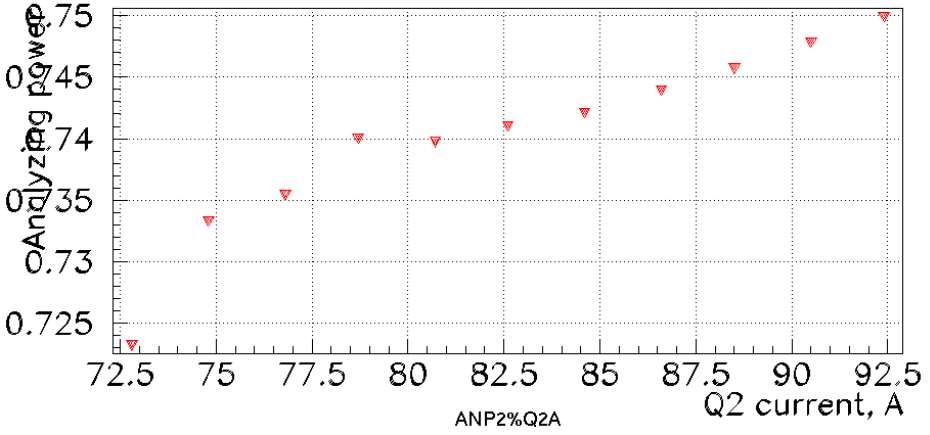
Beam polarization ~85-86%

Q1 and Q2 Scan Results

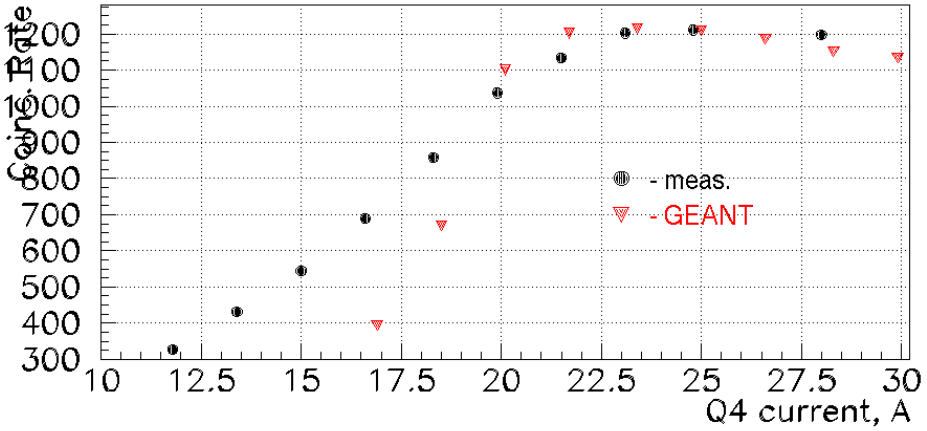


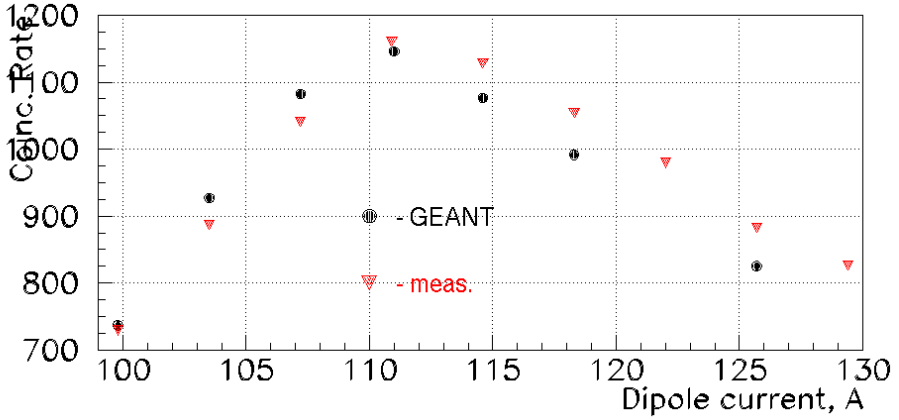


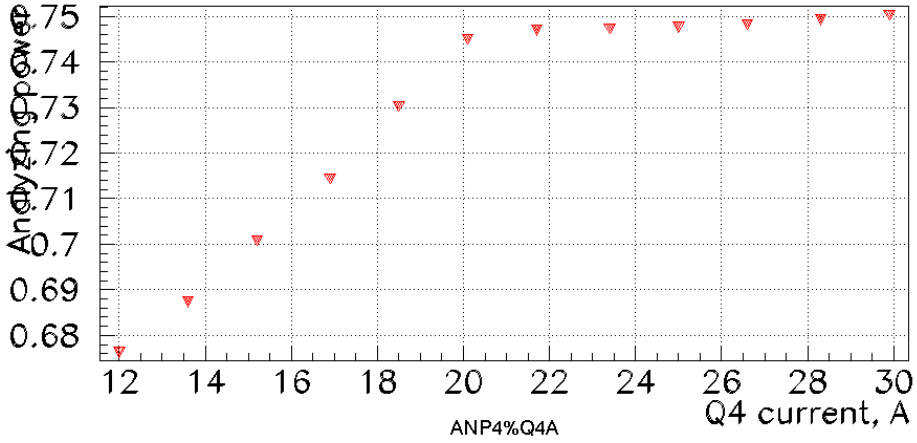


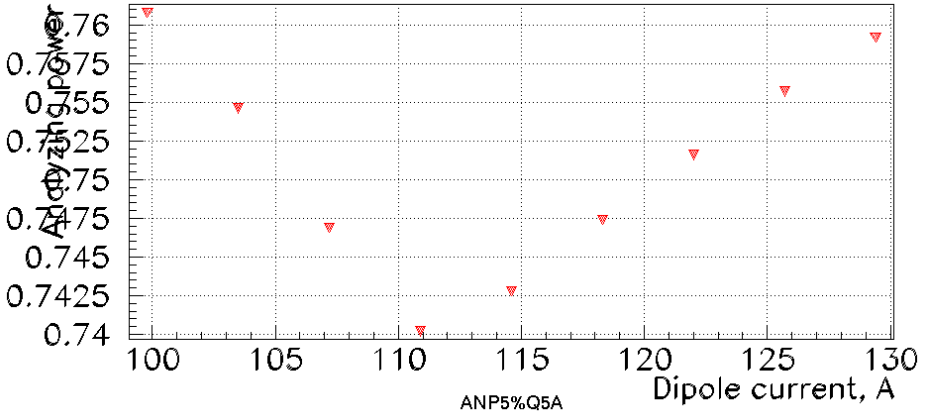


Q4 and Dipole Scan Results

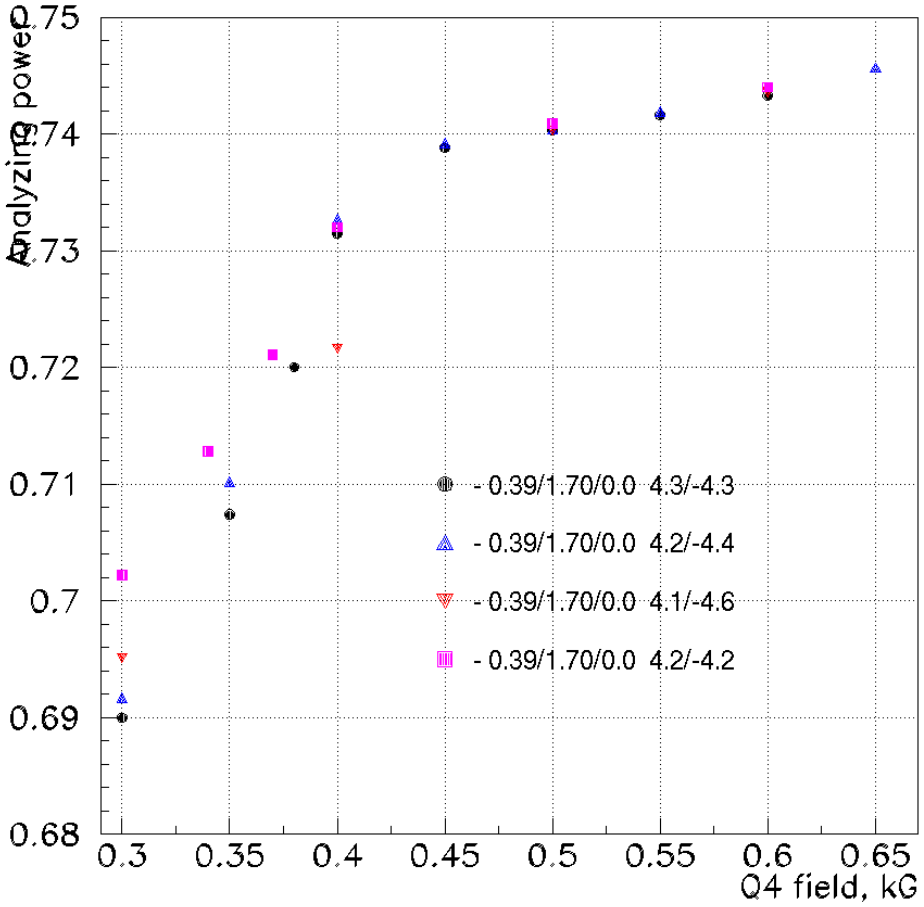


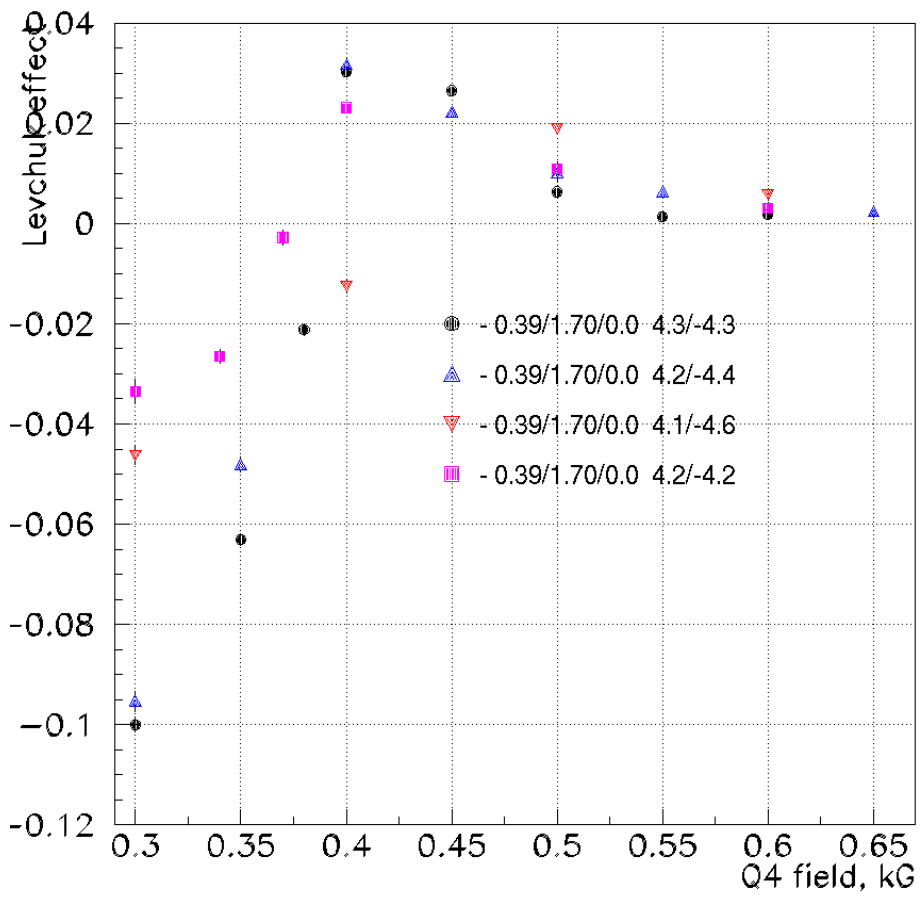






Levchuk-effect Study





Quads Power Supply

Quad Name	Polarity	Current Range, A	Moller req., A
MQO1H02	Mono+switch	260	+/-315
MQM1H02	Bipolar	+/-315	+/-300
MQO1H03	Bipolar	+/-315	+100
MQO1H03A	Bipolar	+/-315	+/-315

Re-connect power supplies of MQO1H02 and MQO1H03