

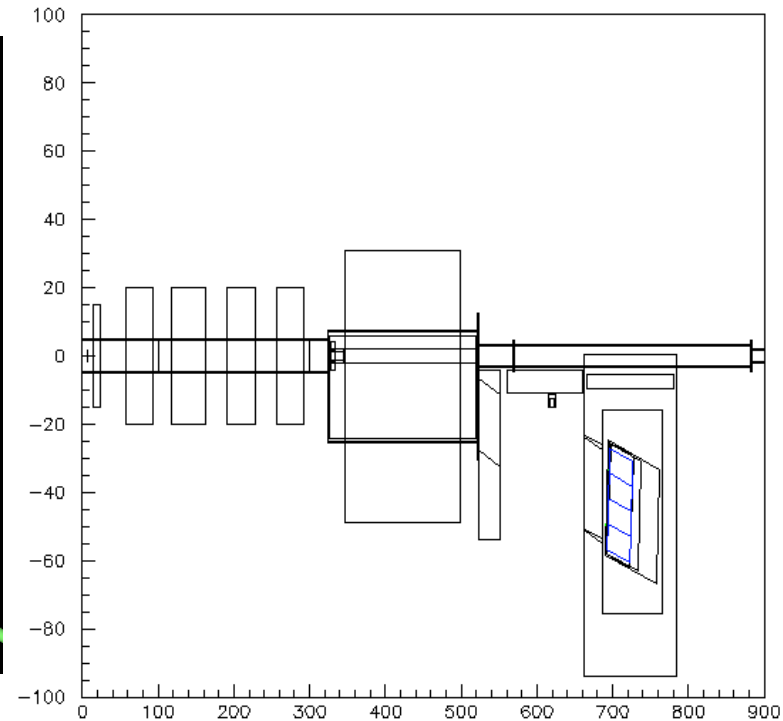
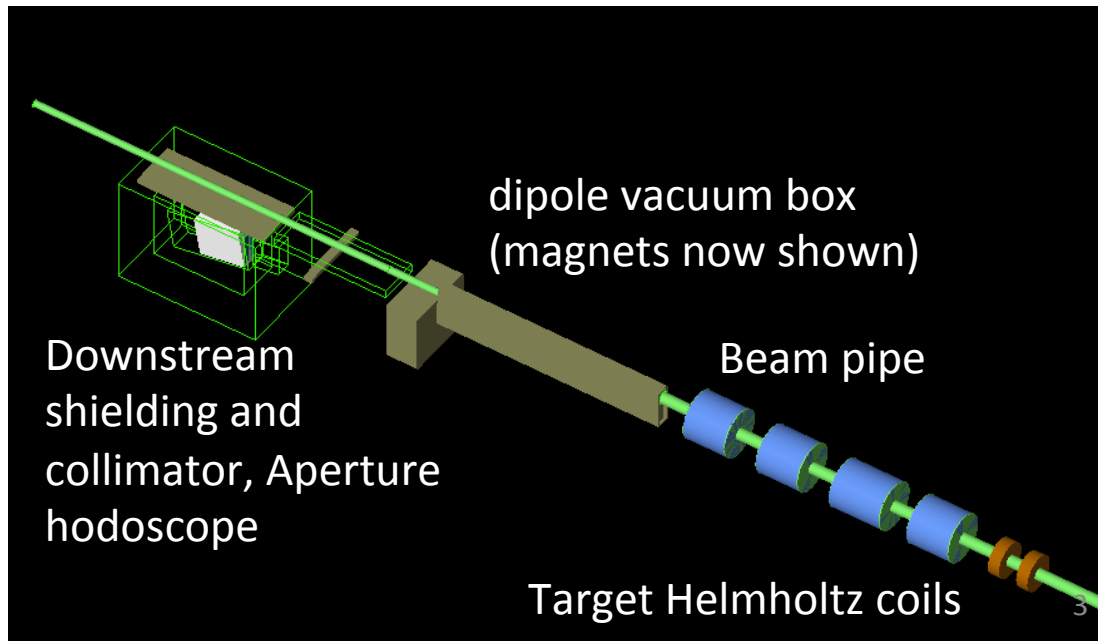
MolPol Simulation Update

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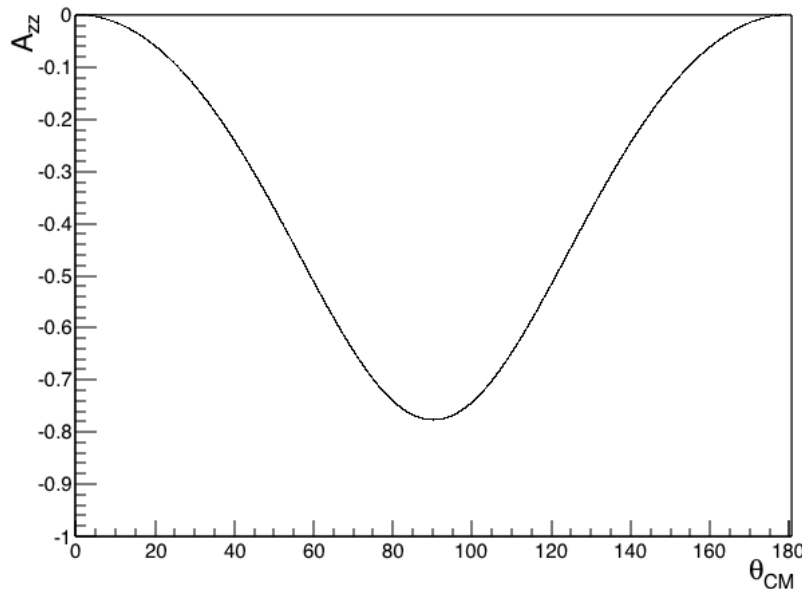
Overview

- New Geant4 based simulation software has been developed
- Nickie set up the initial package
- Simple moller generator (creating two electrons for a given scattering angle)
- Updated geometry, optics tested
- Acceptance check underway

Geant4 geometry



Simple Moller event generator

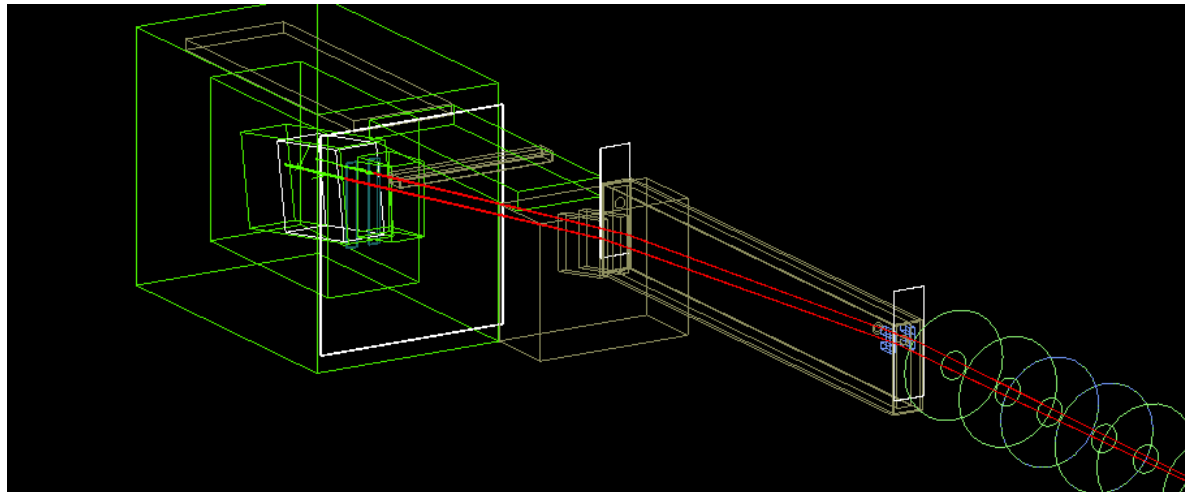


- Creating two electrons with a given scattering angle
- A_{zz} :
$$A_{zz} = -\frac{\sin^2(\theta)(7 + \cos^2(\theta))}{(3 + \cos^2(\theta))^2}.$$
- Generate events in a range of $75 < \theta_{CM} < 105$ degree and $-8 < \phi < 8$ degree

→ Need to improve to have more realistic generator

Optics

- Geant3 simulation uses the simple quadrupole field and so does Geant4
 - $B_x = B' * y$, $B_y = B' * x$ (B' = field gradient)
- The pole tip field is given as an input.
- Tested with various beam energies and confirmed it works well.



Acceptance check

Beam Energy=5.0GeV

Q1=-1.71kG Q2=1.31kG Q3=0.96kG Q4=2.06kG Target=0.0T Dipole=7.0kG

C Beam spot reference limits

C X Y SlopeX SlopeY

BEAMYZLIM -0.001 0.001 -0.001 0.001 -0.000 0.000 -0.000 0.000

MOLLIMTHETA 70. 110. theta range in CM in degrees

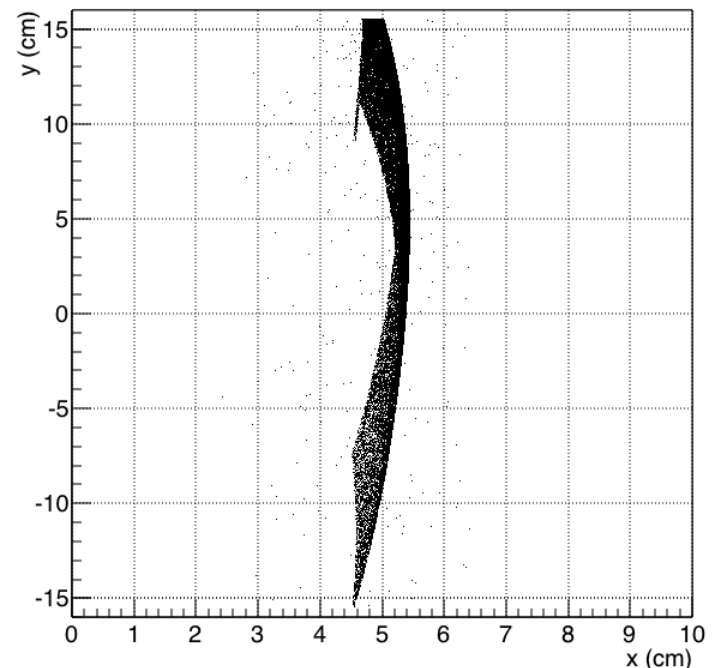
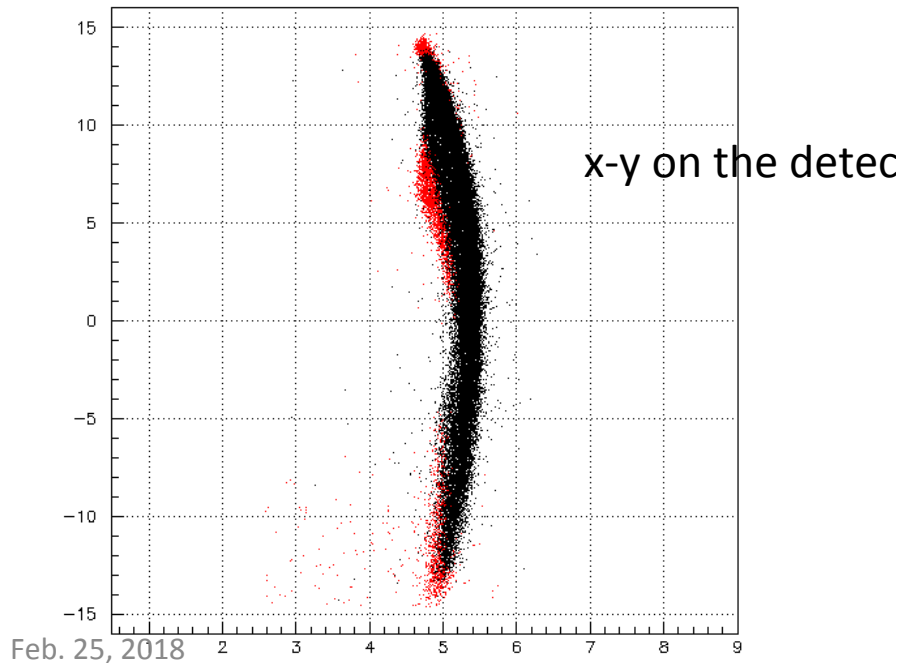
MOLLIMPHI -25. 25. phi range in CM in degrees

Events=100000 Left arm=47542 Right arm=47622 Coinc=40260

Ener=5.0 An.power=0.750703+/-0.000124356

Theta=8.83553 Phi=7.77678

Geant4: single arm gives acceptance of ~49%

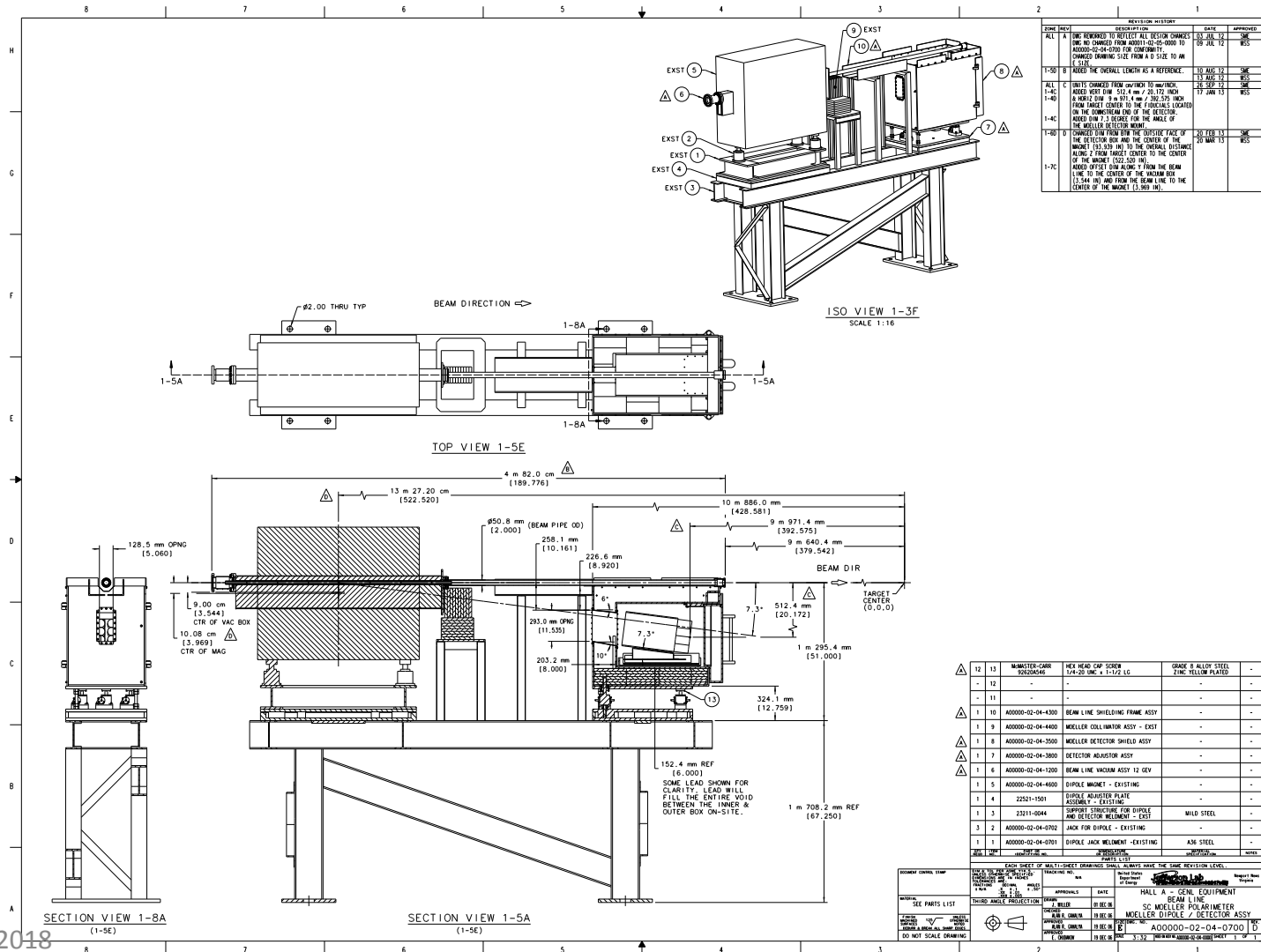


Task list

- Initial setup (done)
- Updating geometry (done)
- Optics check (done)
- G3 vs G4 xcheck (ongoing)
- Geometry check with survey data
- Updating generator - realistic generator
- Xcheck with data
- A_{ZZ}
- Systematic studies (magnet tune, Levchuk effect, ..)

backup

Geometry from the design doc



geant3 z-y distribution

