Steps for MOLLER Magnetic Field Study

February 2024

- ☐ Generate root files - see table below. [1-3 days]
    a. Symmetric: ideal field with perfect symmetry
        - /volatile/halla/moller12gev/ktevans1/rootfiles2024/MagFieldStudy/Symmetric/
        - V2U.1a.50cm.parallel.txt
        - subcoil_2_3_3mm_full.txt
    b. DipolePoint5Same: asymmetric field with coils offset by 0.5mm in the same direction - **missing**
    c. DipolePoint5Rand: asymmetric field with coils offset by 0.5mm in random directions
        - V2U.1a.50cm.parallel.real_asymmetric.txt
        - subcoil_2_3_3mm_real_asymmetric.txt
    d. Dipole3SameSC23: asymmetric field with coils offset by +/- 1 or 3 mm in same direction with subcoil 2 and 3 are 3mm lower than nominal positions
        - US_Asym_CP2B_pm_1_3.txt
        - DS_Asym_CP2B_pm_1_3.txt
    e. DipolePoint5SameSC23: asymmetric field with coils offset by 0.5mm in the same direction with subcoil 2 and 3 are 3mm lower than nominal positions
        - US_CoilA-G_Asy_0dot5mm_case-II.txt
        - DS_CoilA-G_Asy_0dot5mm_case-II.txt
    f. DipolePoint5RandSC23: asymmetric field with coils offset by 0.5mm in random directions with subcoil 2 and 3 are 3mm lower than nominal positions
        - US_CoilA-G_Asy_0dot5mm_case-I.txt
        - DS_CoilA-G_Asy_0dot5mm_case-I.txt
- ☐ Set up a separate repository for scripts. Make sure that this can be used on a local computer, not on the JLab computing farm. [2-3 days]
- ☐ Redo study from last year with updated sieve geometry. [1-2 days]
- ☐ Use ellipses on 2D plots instead of analyzing 1D plots. [2-3 days]
- ☐ What variables are most affected by asymmetries in the magnetic field? [2-3 days]
    a. r vs. phi
    b. r vs. r'
    c. phi vs. phi'
- ☐ Vassu has a method of excluding radiative effects. How do the magnetic field study results look if we use this method? [2-3 days]
- ☐ Is there a specific beam energy in which we are able to see the best results?
    a. Pass-2 C12
    b. Pass-3 C12

    c. Pass-5 LH2

- [ ] Is there a specific target location/type for which we are able to see the best results?
    a. Upstream C12 foil - Optics2
    b. Middle C12 foil - Optics3
    c. Downstream C12 foil - Optics1
    d. LH2

Field Map	Beam Energy [GeV]	Target	Generator	Beam Current [uA]	Sieve Rotation [deg]	Number of Events	Root File Name
Symmetric	4.4	DS C12	eC12	1	0	1M	02132024_Pass2_Optics1_sieveIN_elasticC12_1M.root
Symmetric	4.4	US C12	eC12	1	0	1M	02132024_Pass2_Optics2_sieveIN_elasticC12_1M.root
Symmetric	4.4	Mid C12	eC12	1	0	1M	02132024_Pass2_Optics3_sieveIN_elasticC12_1M.root
Symmetric	6.6	DS C12	eC12	1	0	1M	02132024_Pass3_Optics1_sieveIN_elasticC12_1M.root
Symmetric	11	LH2	Moller	1	0	1M	02132024_Pass5_LH2_sieveIN_moller_1M.root
DipolePoint5Same	4.4	DS C12	eC12	1	0	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+(360/7)	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+2(360/7)	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+3(360/7)	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+4(360/7)	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+5(360/7)	1M	
DipolePoint5Same	4.4	DS C12	eC12	1	+6(360/7)	1M	
DipolePoint5Same	4.4	US C12	eC12	1	0	1M	
DipolePoint5Same	4.4	Mid C12	eC12	1	0	1M	
DipolePoint5Same	6.6	DS C12	eC12	1	0	1M	
DipolePoint5Same	11	LH2	Moller	1	0	1M	
DipolePoin	4.4	DS C12	eC12	1	0	1M	

t5Rand							
DipolePoint5Rand	4.4	DS C12	eC12	1	+(360/7)	1M	
DipolePoint5Rand	4.4	DS C12	eC12	1	+2(360/7)	1M	
DipolePoint5Rand	4.4	DS C12	eC12	1	+3(360/7)	1M	
DipolePoint5Rand	4.4	DS C12	eC12	1	+4(360/7)	1M	
DipolePoint5Rand	4.4	DS C12	eC12	1	+5(360/7)	1M	
DipolePoint5Rand	4.4	DS C12	eC12	1	+6(360/7)	1M	
DipolePoint5Rand	4.4	US C12	eC12	1	0	1M	
DipolePoint5Rand	4.4	Mid C12	eC12	1	0	1M	
DipolePoint5Rand	6.6	DS C12	eC12	1	0	1M	
DipolePoint5Rand	11	LH2	Moller	1	0	1M	
Dipole3SameSC23	4.4	DS C12	eC12	1	0	1M	
Dipole3SameSC23	4.4	DS C12	eC12	1	+(360/7)	1M	
Dipole3SameSC23	4.4	DS C12	eC12	1	+2(360/7)	1M	
Dipole3SameSC23	4.4	DS C12	eC12	1	+3(360/7)	1M	
Dipole3SameSC23	4.4	DS C12	eC12	1	+4(360/7)	1M	
Dipole3Sa	4.4	DS C12	eC12	1	+5(360/7)	1M	

meSC23							
Dipole3SameSC23	4.4	DS C12	eC12	1	+6(360/7)	1M	
Dipole3SameSC23	4.4	US C12	eC12	1	0	1M	
Dipole3SameSC23	4.4	Mid C12	eC12	1	0	1M	
Dipole3SameSC23	6.6	DS C12	eC12	1	0	1M	
Dipole3SameSC23	11	LH2	Moller	1	0	1M	