Searching for a Solenoid for SoLID

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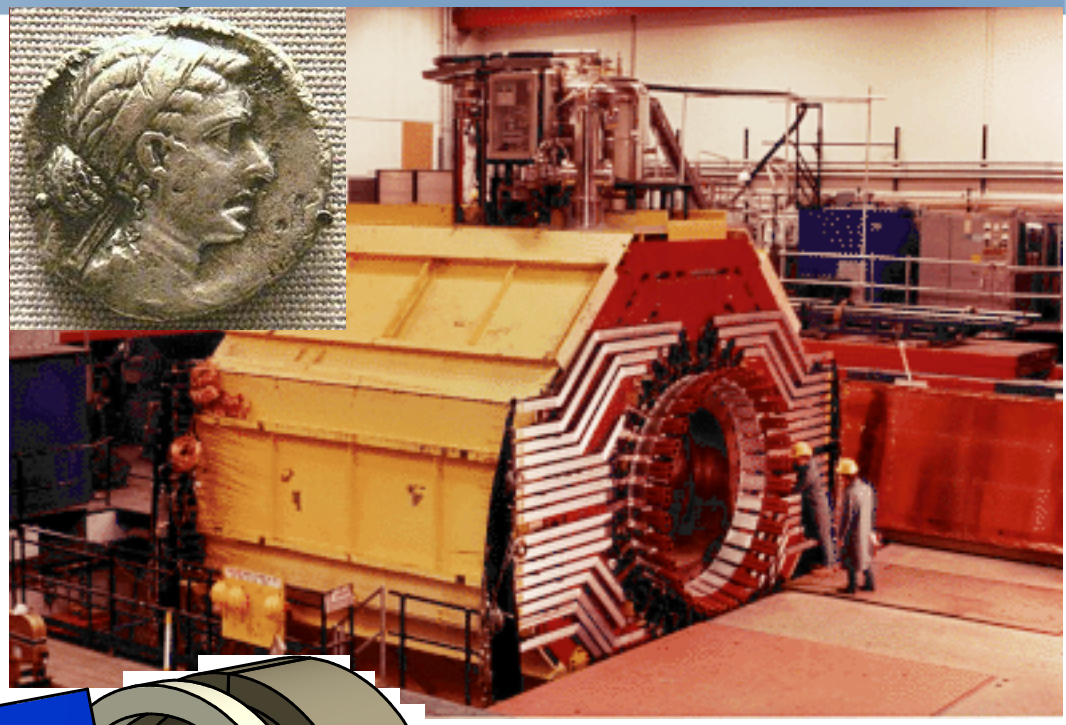
1. Choice of coil
2. Progress in obtaining coil
3. Field maps
   - Discussion of issues

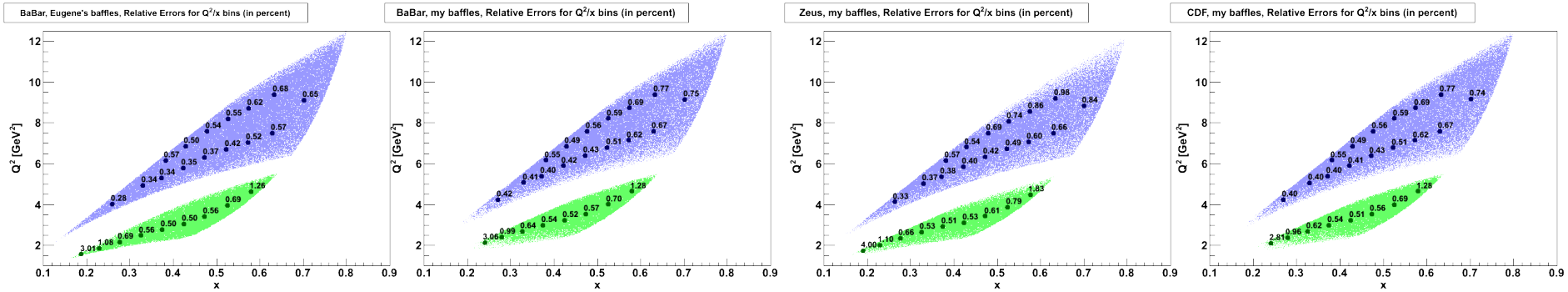


Magnet Comparison

	BaBar	CLEO	ZEUS	CDF	Glue-X		New
					Old SLAC	New	
Cryostat Inner Radius	150 cm	150 cm	86 cm	150 cm			Whatever we need
Length	345 cm	350cm	245cm	500 cm			
Central Field	1.49T	1.5T	1.8T	1.47T			
Flux Return Iron	Yes	Yes	No	No			
Cool Icon	Yes	Yes	Yes	No	No		
Variation in Current density with z?	2x more in end than central	4.2% more in end than central	40% more in end than central	No	Yes	Yes	
Available	Probably Not??	Probably	Probably	Probably	One will be available		*Wild* guess-- $5M

Choice of Coil--considerations

- Can it do the physics?—At a reasonable cost?
  - Significant work before the previous collaboration meeting
  - Please see slides from **Zhiwen Zhao, Seamus Riordan and Lorenzo Zana** from the last collaboration meeting: https://hallaweb.jlab.org/wiki/index.php/Meeting_solid_coll_2011_06



  - Similar studies were done for SIDIS as well.
  - All proposed magnet coils seem to be workable
- Is it likely to be available?
  - Babar magnet going to b-factory?
- Design time
  - Most work done around Babar coil
  - CLEO coil is very similar

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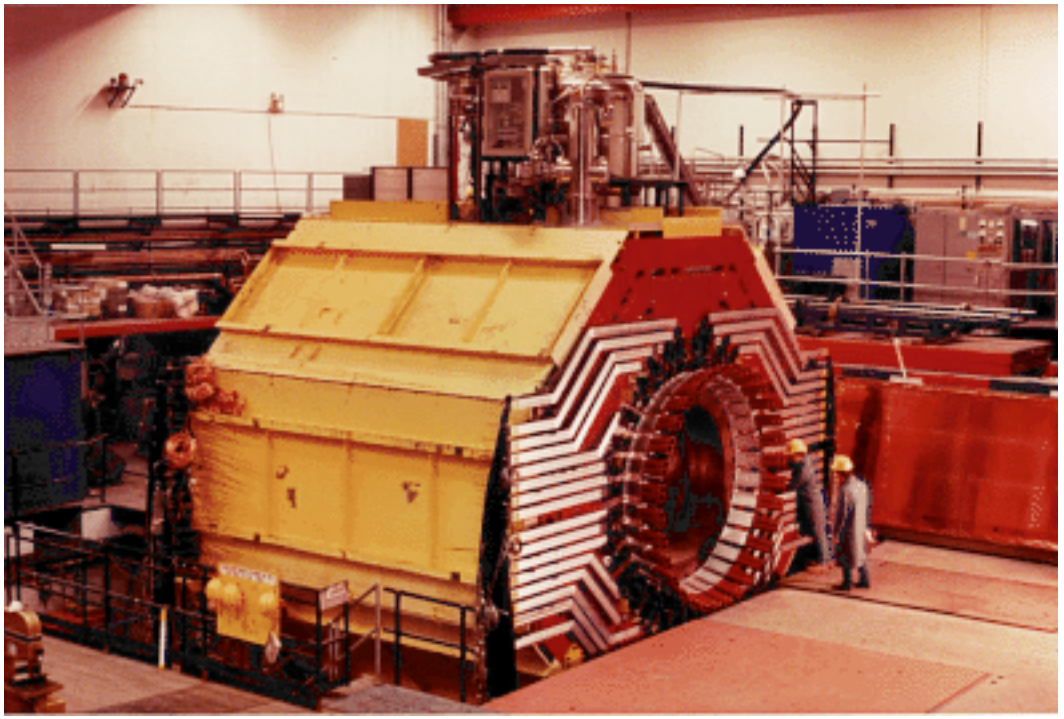
Obtaining the CLEO coil



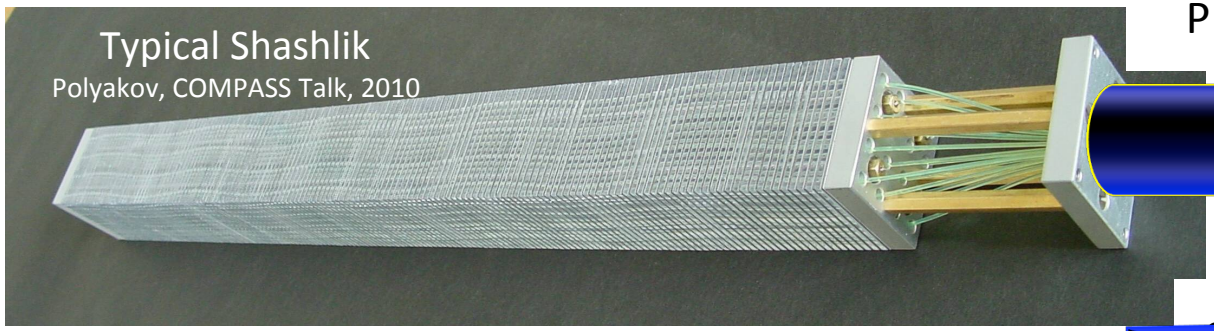
- We (Paul Souder) have begun discussions with Cornell faculty on the possibility of moving the magnet
- Possible in 2013 CESR summer shutdown
  - This is SOON!
  - Where could we store the coil at JLab???)
  - How much will this move cost?
  - What level of CD* do we need from DOE to obtain money to pay for this?

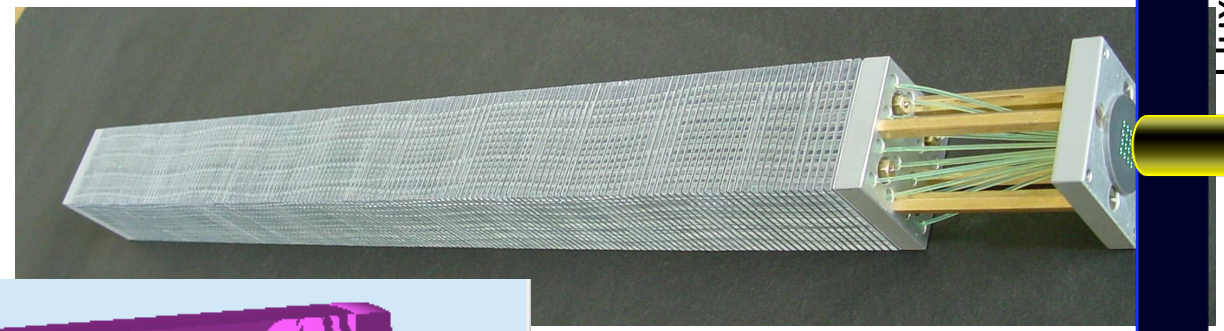
- Need to start Laboratory-to-Laboratory discussions now, rather than collaborator-to-collaborator as we are currently doing
  - **Point person** (Rolf Ent???)
  - For a DOE review:
    - **We need a cost estimate?**
    - **Do we need a letter giving a firm commitment from CLEO/Cornell?**

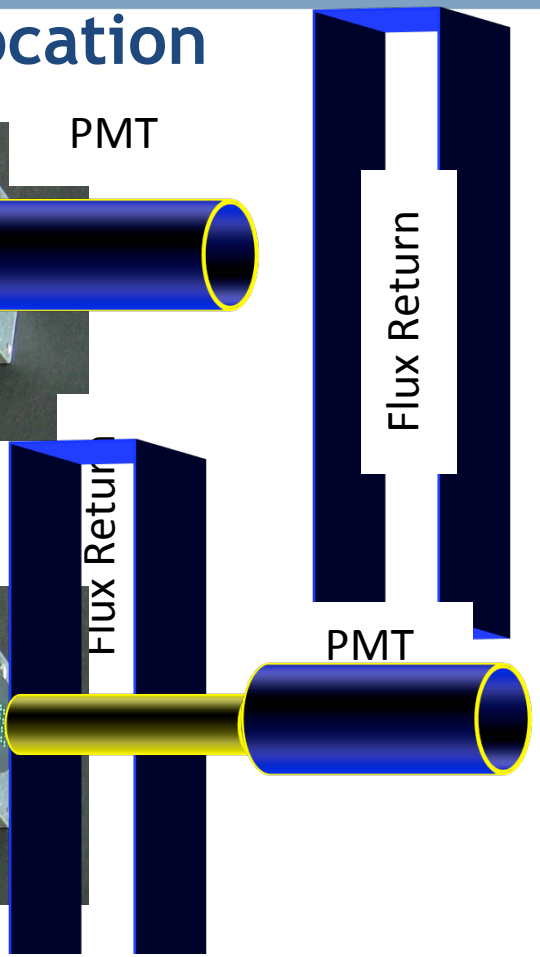
Magnet Yoke Considerations/Field Maps

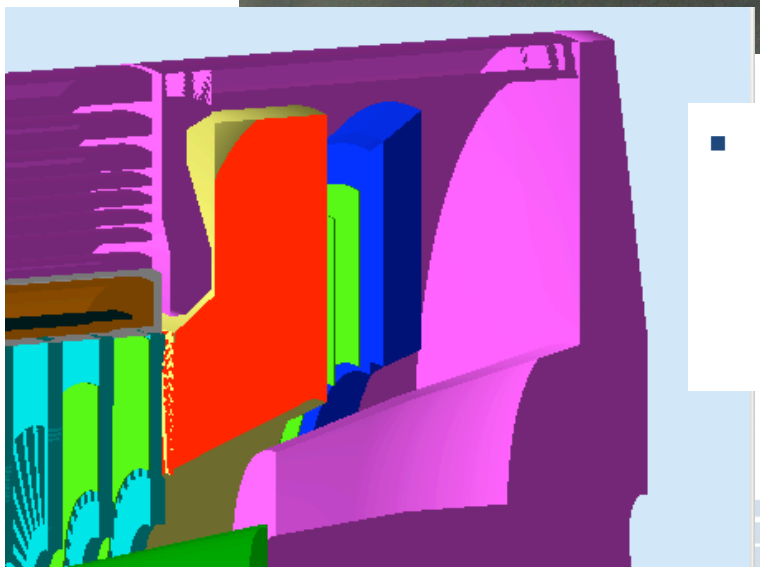
- EM Calo readout
- Differences in SI/PV-DIS detector packages
- Cherenkov PMT—shielding from magnetic field
- SIDIS polarized target—shielding from magnetic field

Size of End Cap—Calorimeter Readout Location



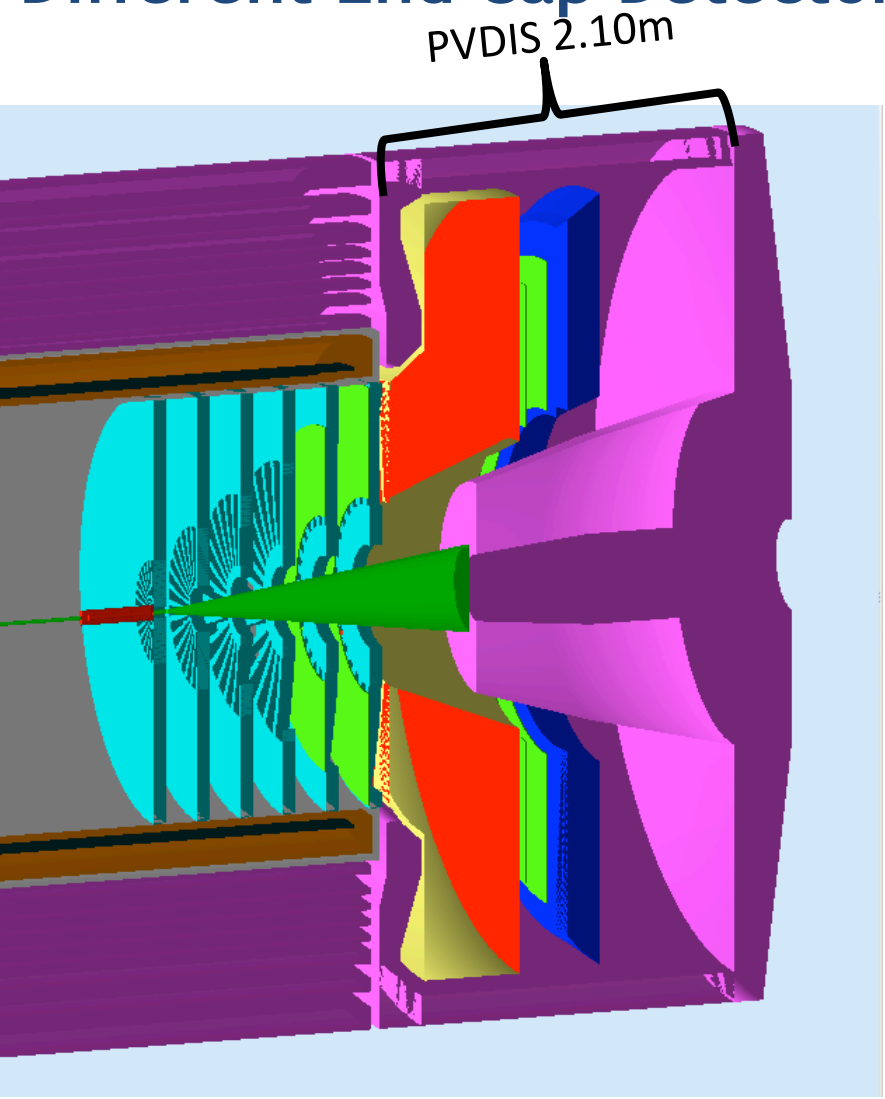


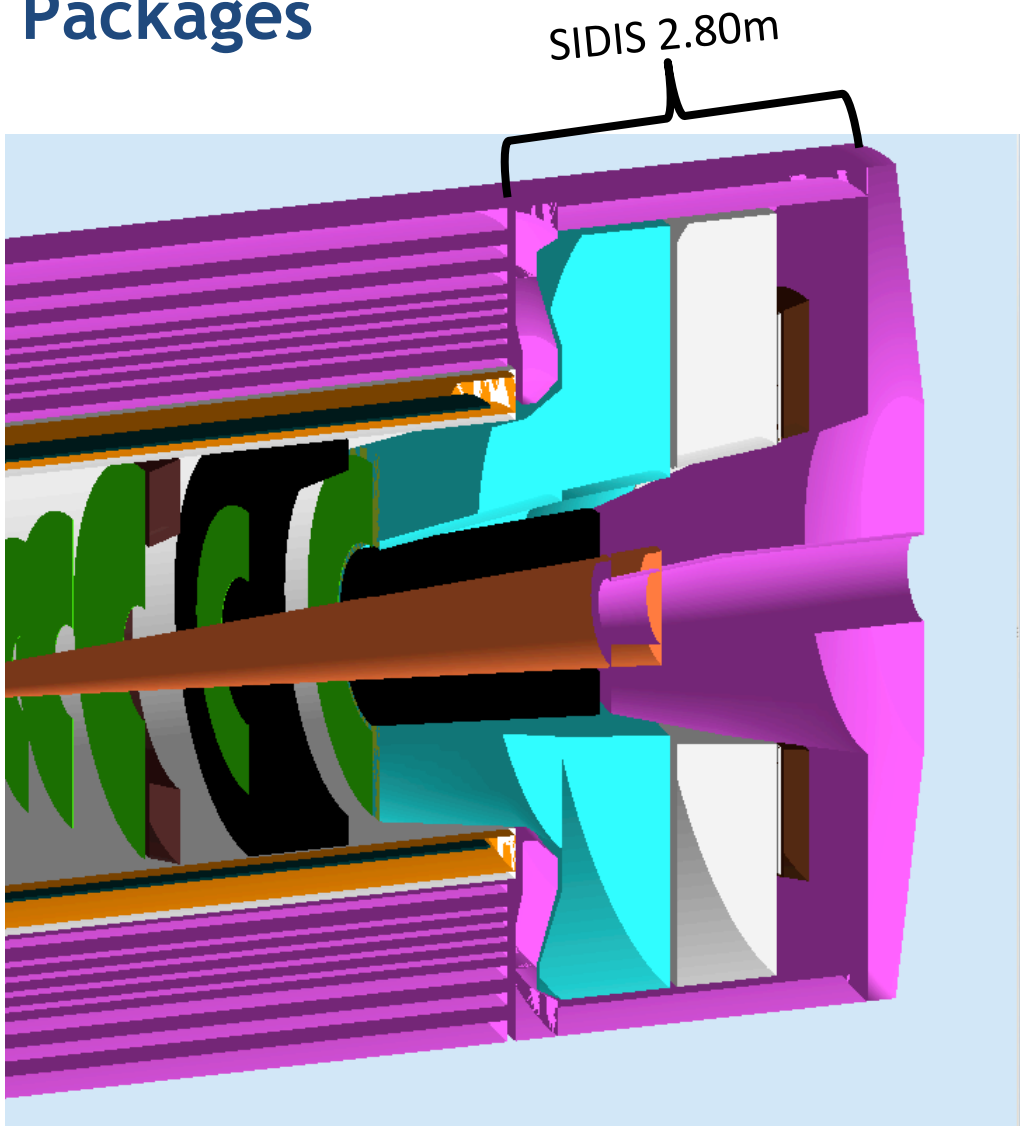




- Place PMT's in- or outside of flux return
  - Magnetic field
  - Servicing
  - SI/PV DIS reconfiguration
  - Light guide cost/holes in flux return

Different End Cap Detector Packages





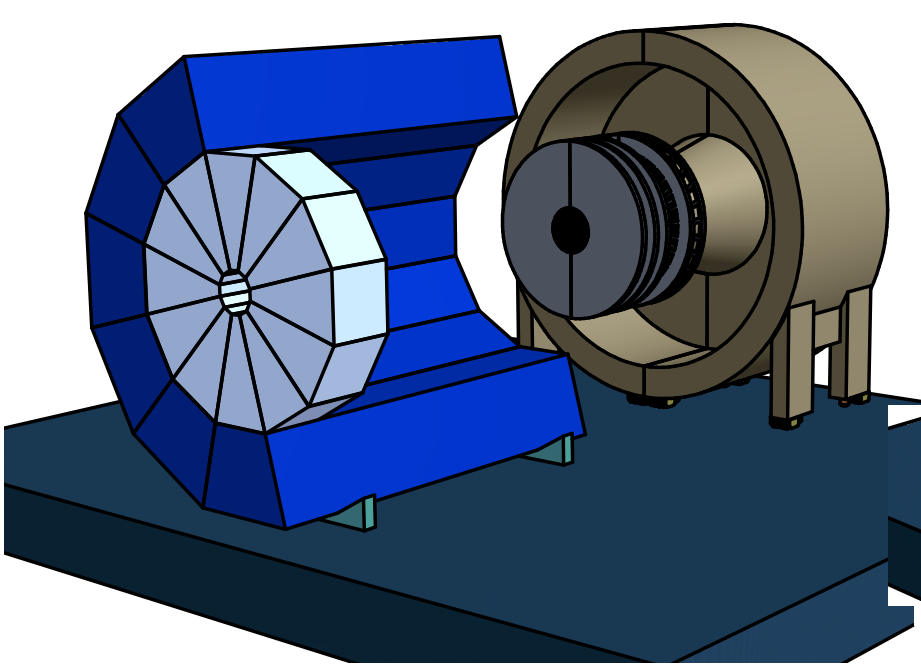
Flux return for PVDIS and SIDIS

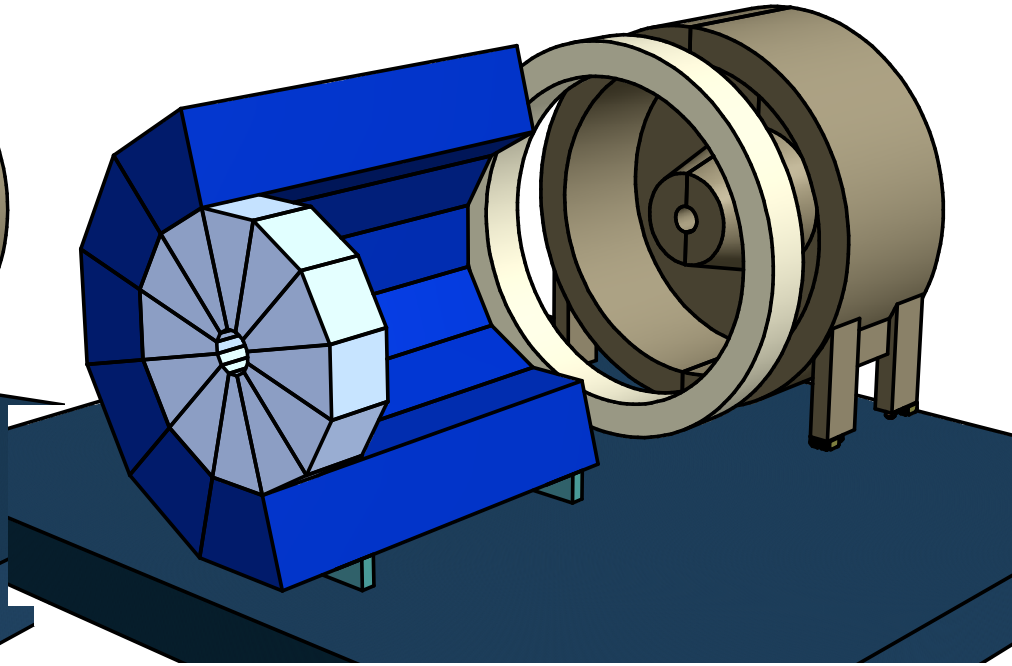
PVDIS

- Attach EM calo to back wall
- Readout outside of magnet w/light guides

SIDIS

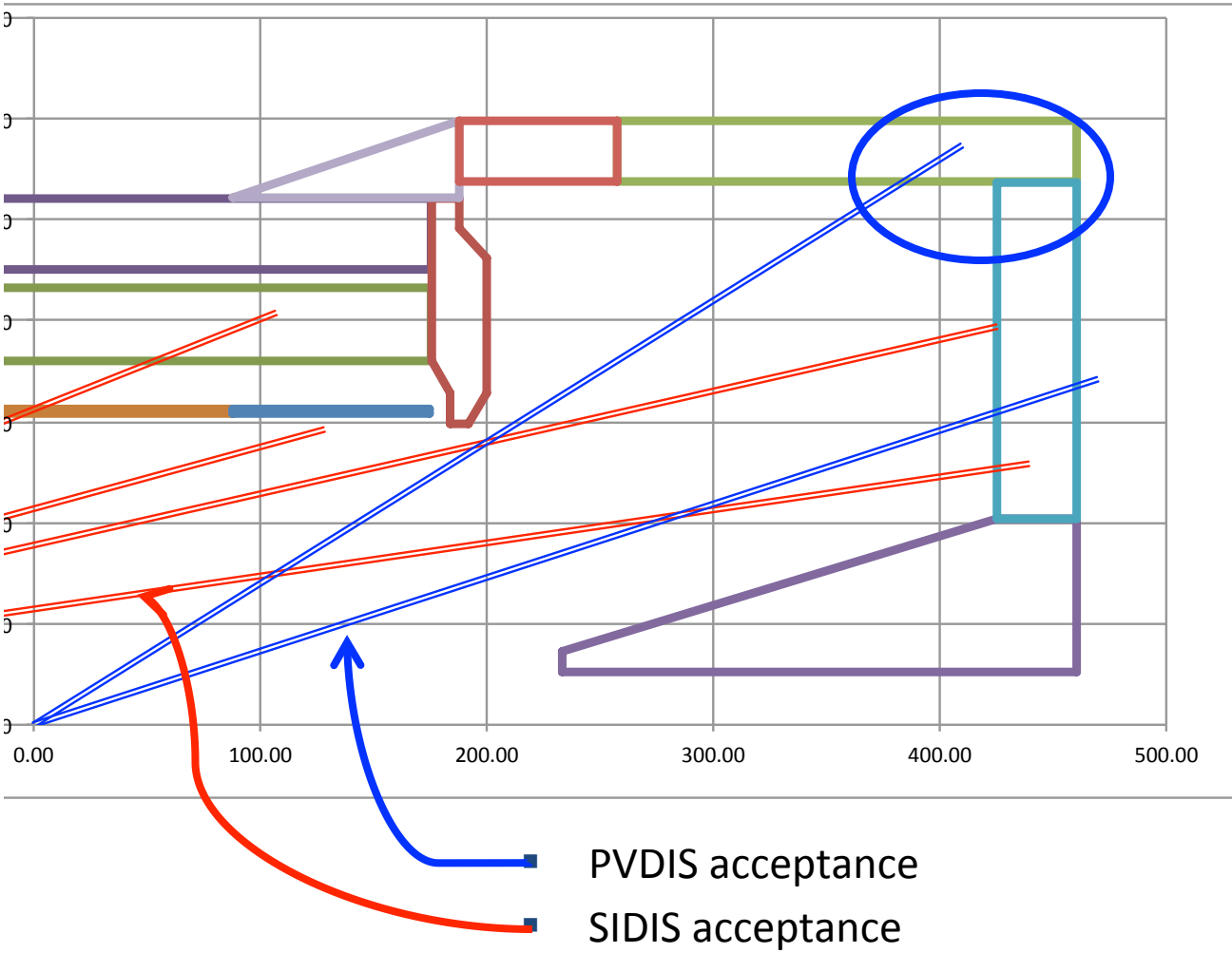
- Add “shim” or “donut” for additional detector space
- Possibly use shim to house heavy gas Cherenkov—would require 2nd shim configuration



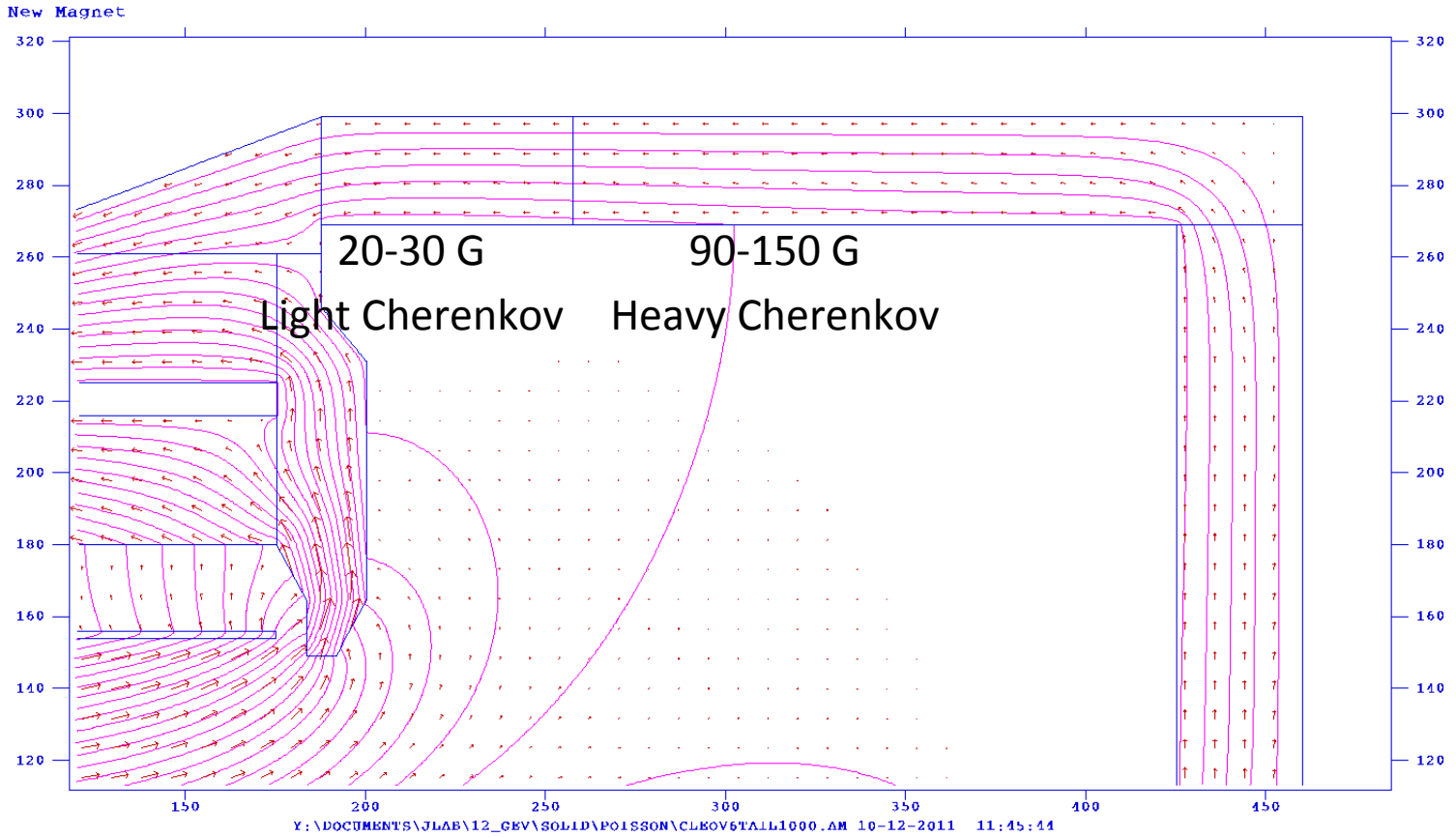


Common end cap to fit SIDIS

- EM calorimeter could not be mounted to rear wall of end cap
- Must be movable to match acceptance



Field in Cherenkov PMT region



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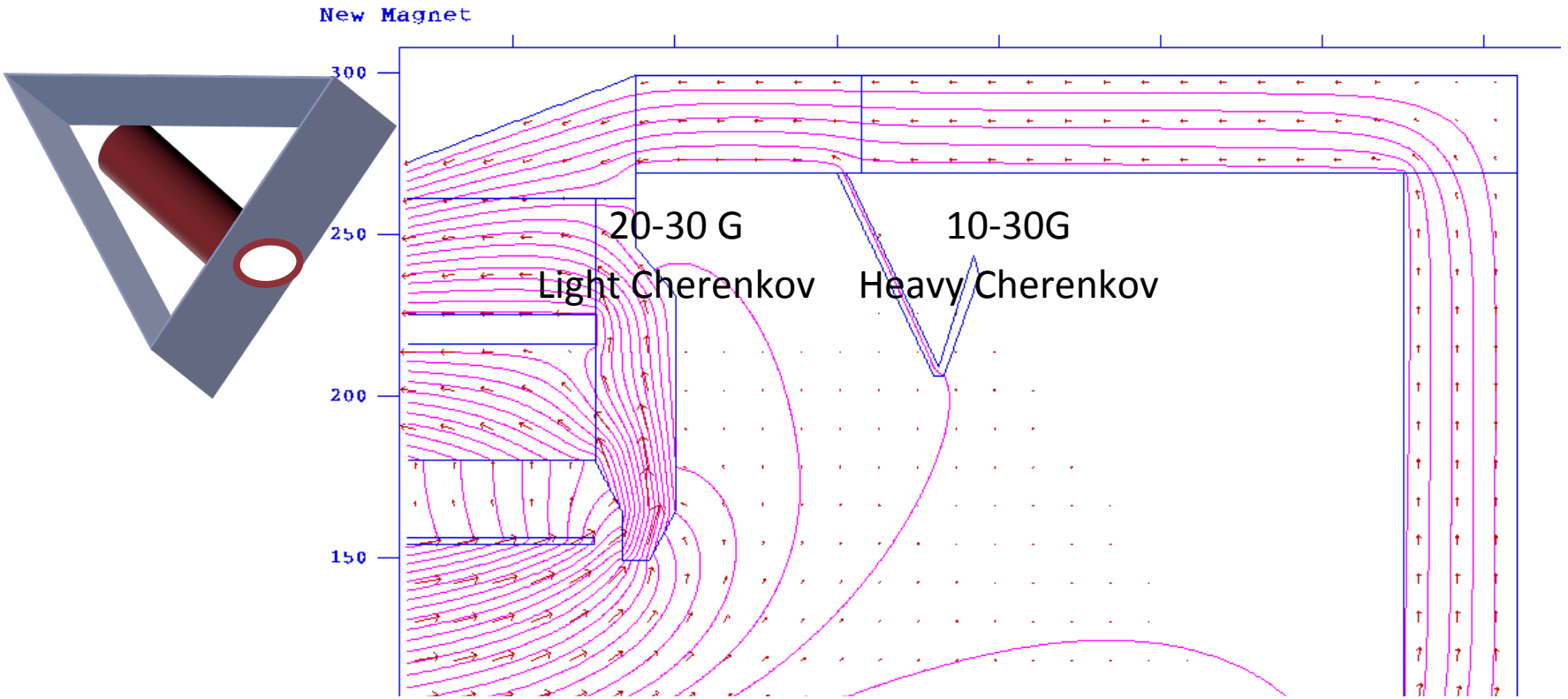
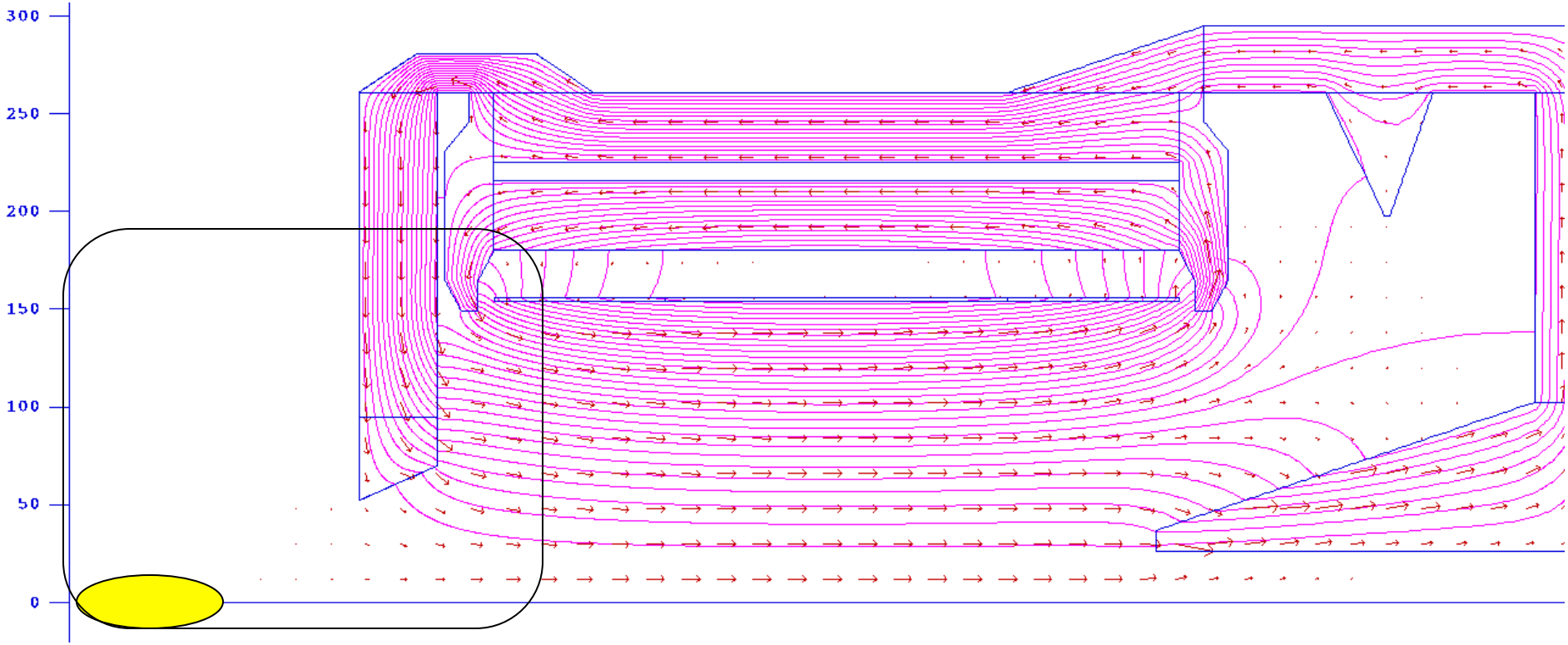


- Shielding Cherenkov PMT's is possible
- Should be done in 3d (Poisson with gap will give worst case

SIDIS Target region field

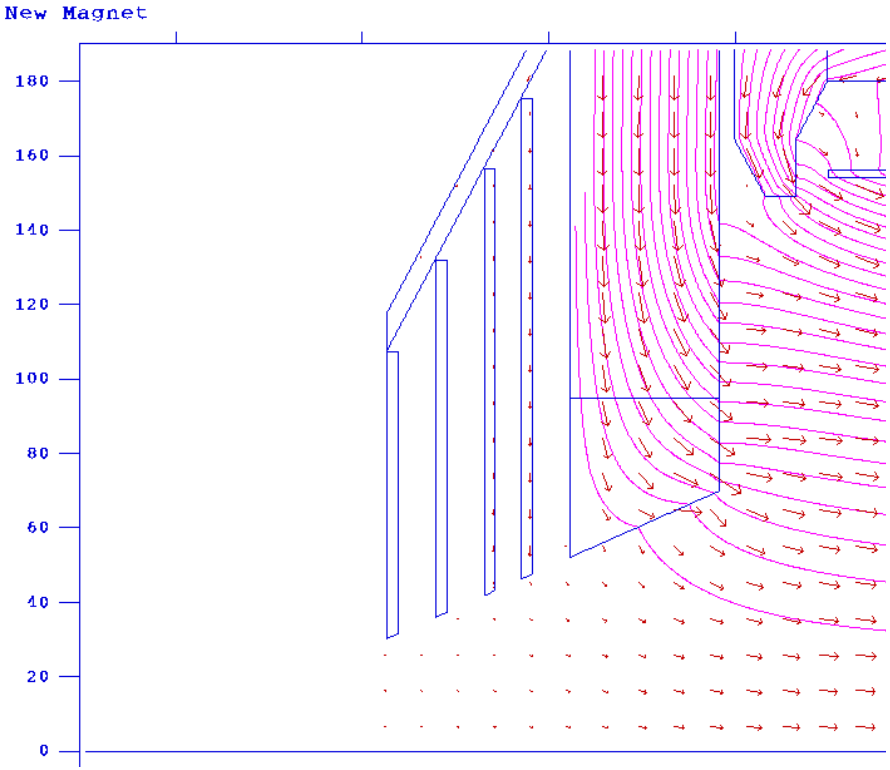


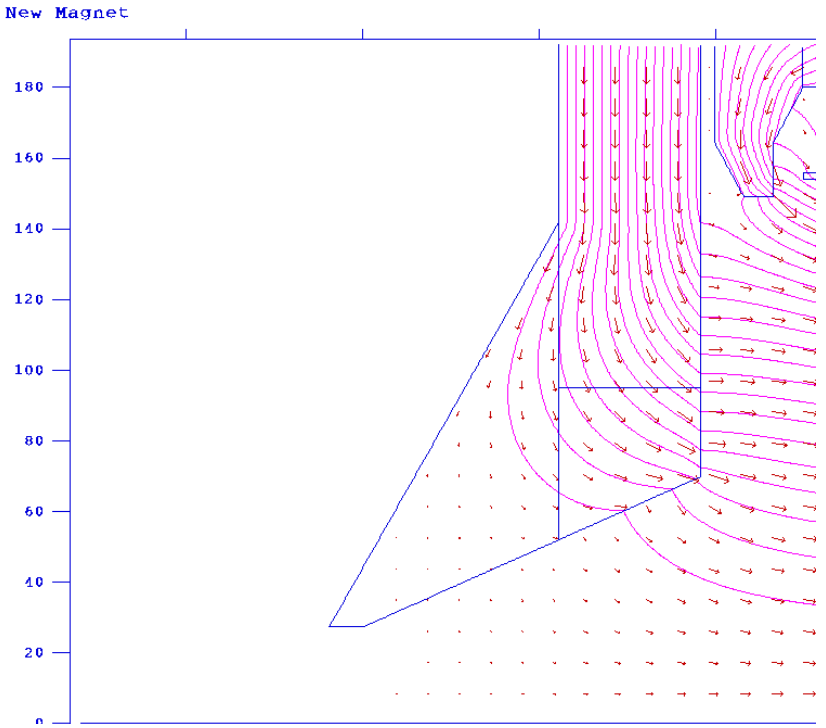
- What is the field in the SIDIS Target region?
- What field can we stand?

R (cm)	Z (cm)	Br (G)	Bz (G)	|B| (G)	A (G-cm)
0	-350	0.00E+00	5.11E+01	5.11E+01	0.00E+00
1	-350	-7.98E-01	5.11E+01	5.11E+01	2.55E+01
2	-350	-1.60E+00	5.11E+01	5.11E+01	5.11E+01
3	-350	-2.39E+00	5.10E+01	5.11E+01	7.66E+01
4	-350	-3.18E+00	5.10E+01	5.11E+01	1.02E+02
5	-350	-3.85E+00	5.09E+01	5.11E+01	1.27E+02

SIDIS Target region Can it be shielded?

- Both configurations cut field by factor of (approximately) 5

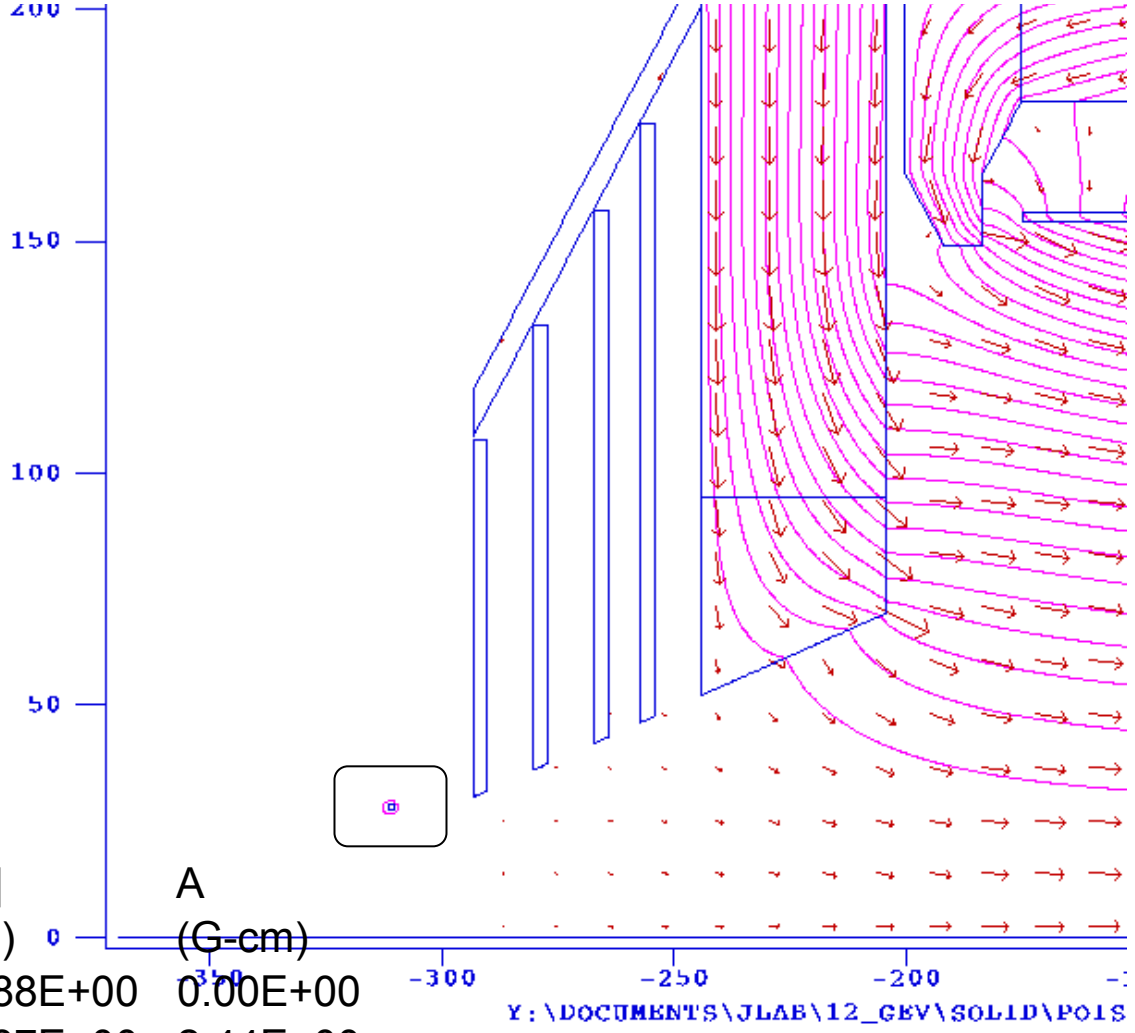




SIDIS Target region

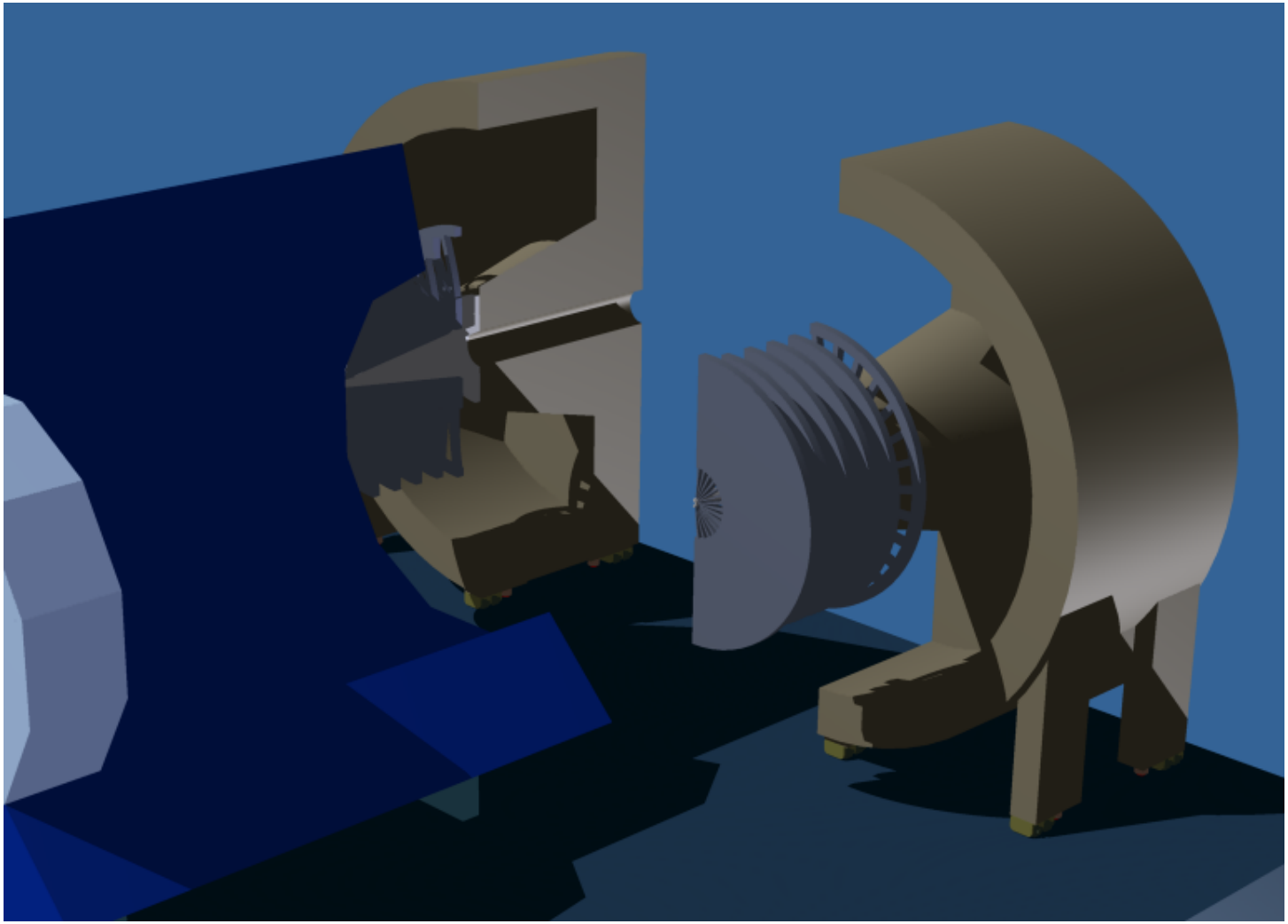
- Add compensating coil
- 1kA-turn

- Reduce B to 5G
- Is this good enough?



R (cm)	Z (cm)	Br (G)	Bz (G)	|B| (G)	A (G-cm)
0	-350	0.00E+00	4.88E+00	4.88E+00	0.00E+00
1	-350	-7.79E-02	4.87E+00	4.87E+00	2.44E+00
2	-350	-1.56E-01	4.87E+00	4.87E+00	4.87E+00
3	-350	-2.33E-01	4.86E+00	4.87E+00	7.30E+00
4	-350	-3.10E-01	4.85E+00	4.86E+00	9.73E+00
5	-350	-3.85E-01	4.84E+00	4.85E+00	1.21E+01

Remember the end cap splits open



Who are we?

Dear SoLID collaborators,

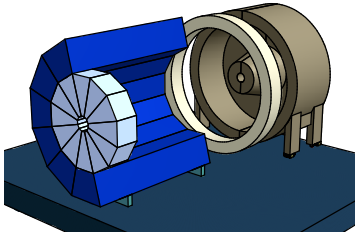
So far, we have been rather loosely organized. At this point in time, it would be nice to establish a collaboration list with institutes and collaborators. I am requesting that one person from each institution supply me with a list of collaborators from that institution, specifying each collaborators "level" (*e.g.* Postdoc, Graduate Student, Undergraduate Student, Professor/Staff Scientist). I would also like one person specified as the contact collaborator for that institution. This list is useful to demonstrate to funding agencies the strength of our collaboration.

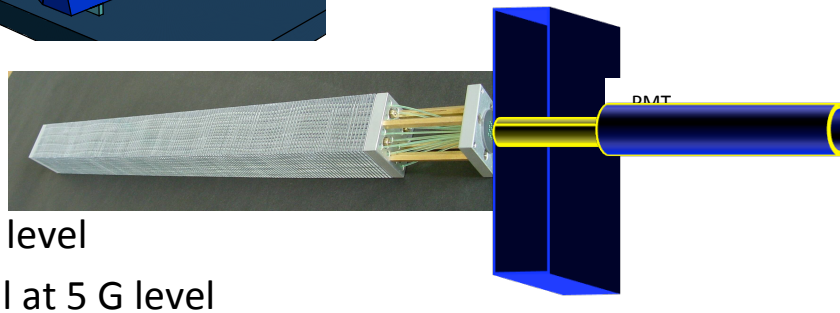
Thanks,

Paul

Conclusions

- SoLID is planning on using the CLEO magnet
- Discussions are underway on how and when to move the magnet to JLab
- Design options to be considered:
  - SI/PV-DIS end cap differences
  - Location of forward calorimeter readout





- Yoke design considerations
  - Possible to shield PMT's for Cherenkov at 30 G level
  - Possible to shield SIDIS target w/ additional coil at 5 G level