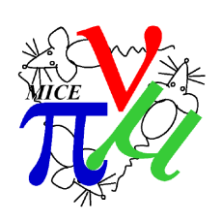


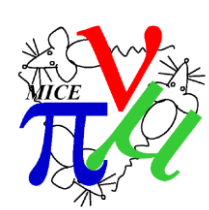
Channel Optics at Step IV

J. Pasternak,
Imperial College London/RAL-STFC



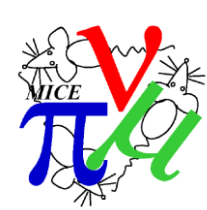
Introduction

- In principle well known and evaluated since years!
- However we need to take into account the best available knowledge based on:
 - Most up to date coil geometry (including survey from the Hall)
 - PRY effect
 - Temperature shrinkage
- Currently there is a trend to have much more settings available than initial standard matrix.



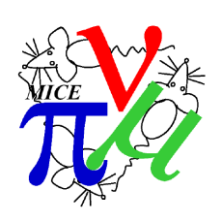
Most up to date geometry

- In optics design we can include longitudinal misalignment, z offset between modules (I am not sure, if we can/should include transverse one-> we can in MC).
- Currently we can use MICE-Note-464 (by V. Blackmore and J. Tarrant) and the survey data (still in evaluation?).

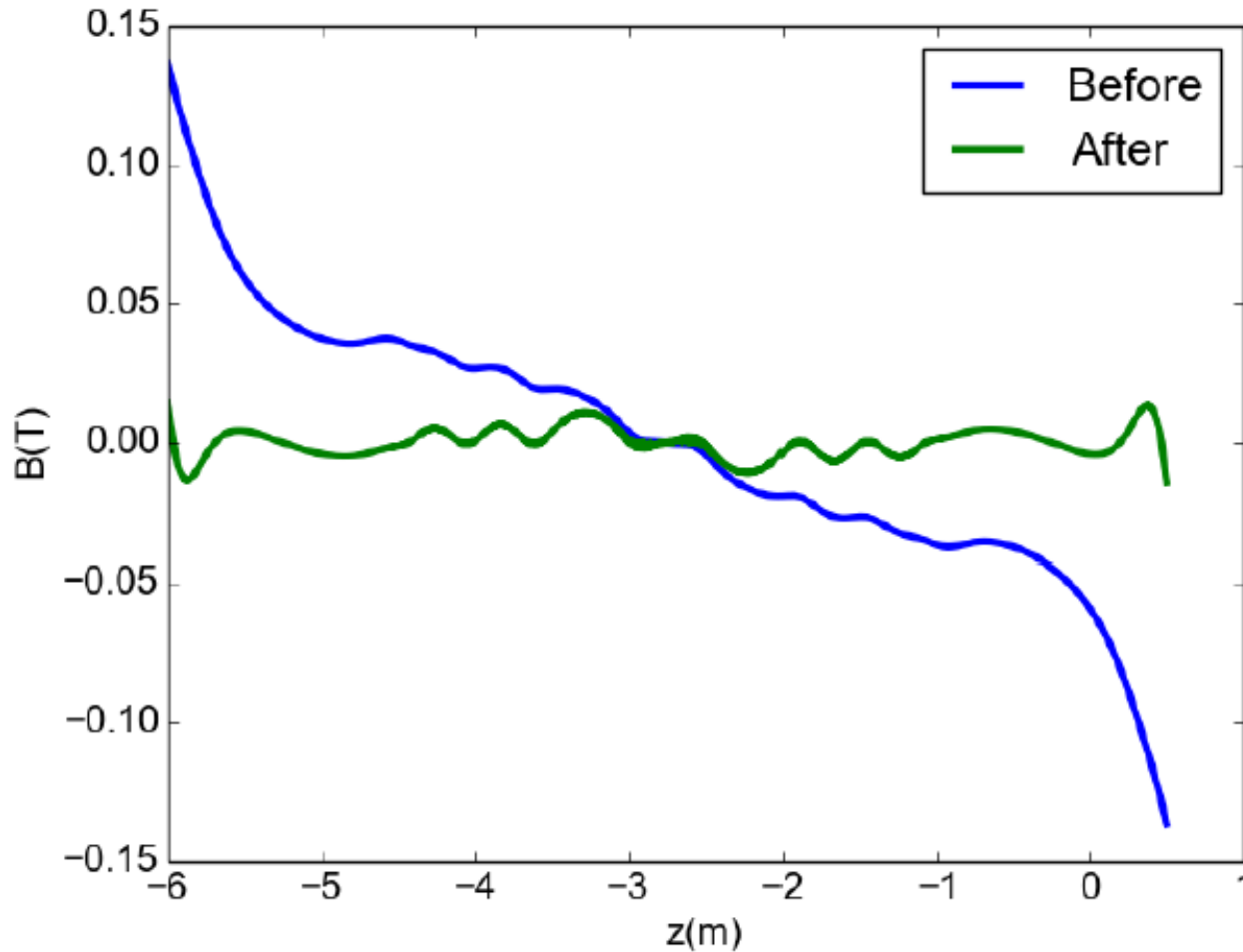


PRY Effect

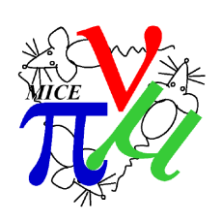
- Effect divided into two regions:
 - Between TOF1 and upstream Tracker (downstream Tracker and TOF2) we will use a field map (possibly two for flip and solenoid modes).
 - Inside Trackers and between Trackers we will evaluate field using Biot-Savart routines equipped with special factors to evaluate effective currents.
 - We await those factors from Holger Witte (BNL).



PRY effect



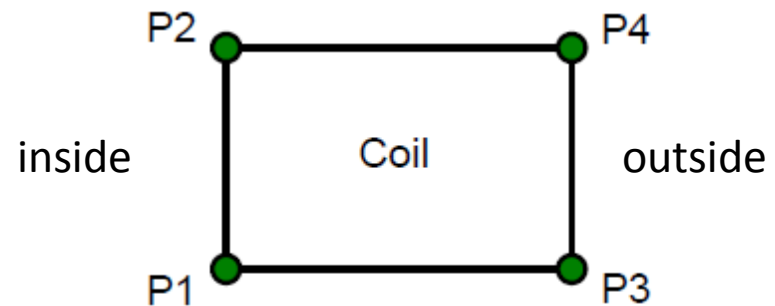
Efficiency of correction of PRY effect by current re-adjustment using correcting factors.



Cryogenic shrinkage

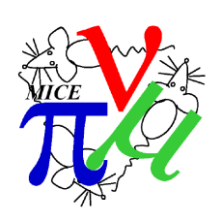
	P1	P2	P3	P4	P1	P2	P3	P4
	R (m)				Z (m)			
E2	0.00082	0.00082	0.00102	0.00101	-0.0037	-0.0033	-0.0036	-0.0034
SS	0.00082	0.00084	0.00088	0.00091	-0.0033	0.0007	-0.0032	0.0006
E1	0.00085	0.00089	0.00102	0.00109	0.0007	0.0011	0.0008	0.001
M2	0.00095	0.00095	0.00105	0.00105	0.002	0.0026	0.002	0.0025
M1	0.00089	0.00087	0.00103	0.00101	0.0034	0.0041	0.0035	0.0039

(Warm dimensions – cold dimensions)



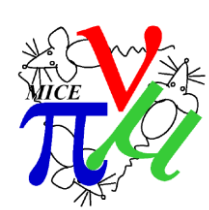
Calculated by H. Witte, BNL

Awaiting similar data for the FC.



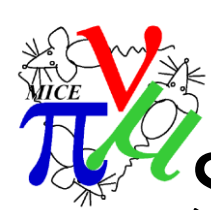
Settings

- Matrix bare settings (at warm, idealised dimensions, without PRY effect) have been created (C. Rogers, J. Pasternak)
- Beta scan in flip was made (C. Rogers).
- Phase advance scan in solenoid mode has been made and now is in MC evaluation (C. Hunt and J. Pasternak).
- Momentum scan and other settings in both flip and solenoid mode with symmetric and asymmetric currents will be created very soon -> we have all the tools know.



Real operational settings

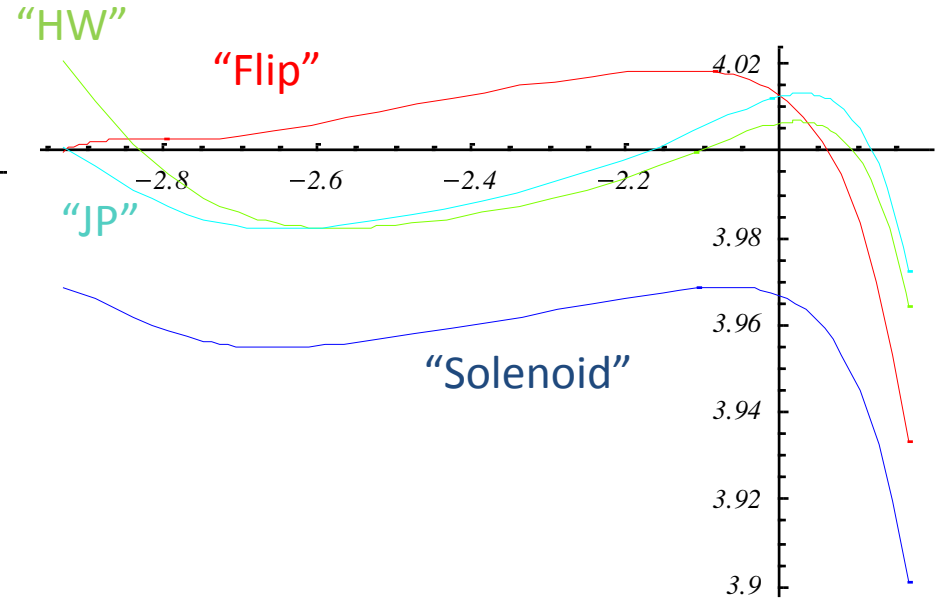
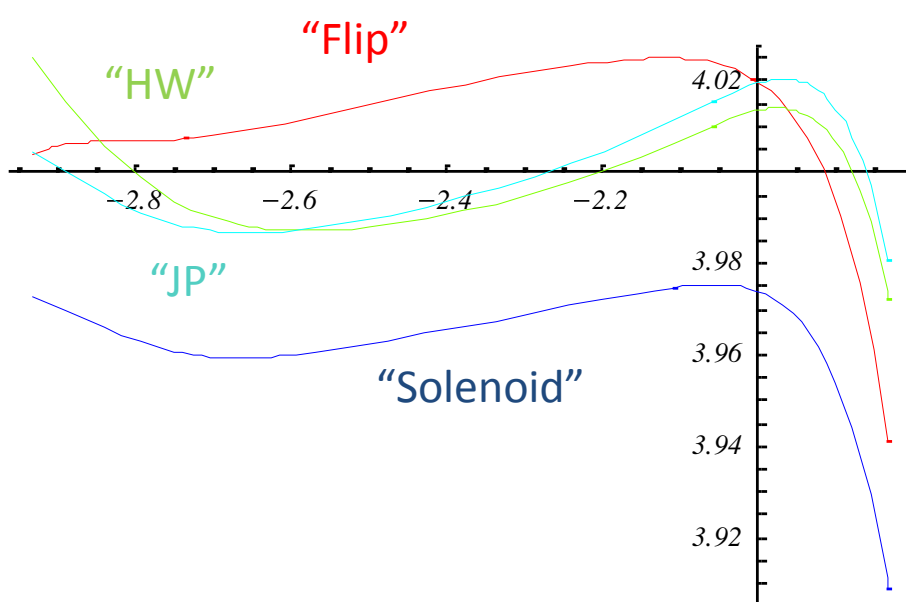
- We have a code, which once provided with PRY factors and geometry update can recalculate hardware currents in seconds.



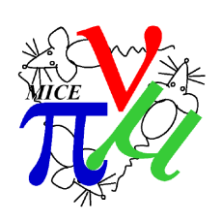
SS fields at Step IV in tracking volume (SSU)

Solenoid mode

Flip mode

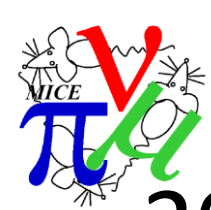


- Setting corresponds to 200 MeV/c symmetric solenoid
- ...Then I just flip the polarity without changing $|J_s|$ (bit incorrect)
- The effect of field non-uniformity are being evaluated (C. Hunt).



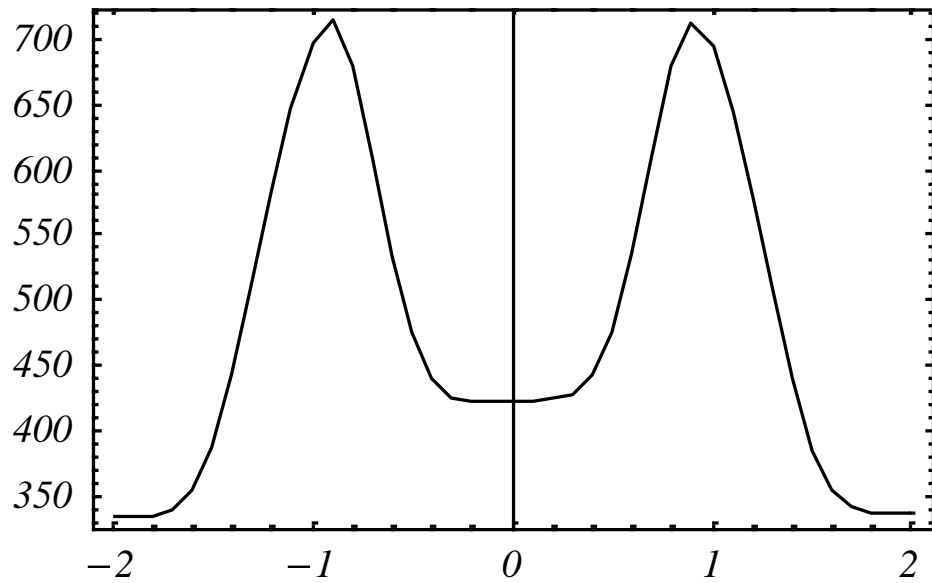
Summary

- We have a principle knowledge to evaluate the real operational currents for the gallery of settings for Step IV.
- Still awaiting for a few more bits and pieces to come.
- However I am confident we will have them in time!
- We aim to have a MICE Note with the full gallery.

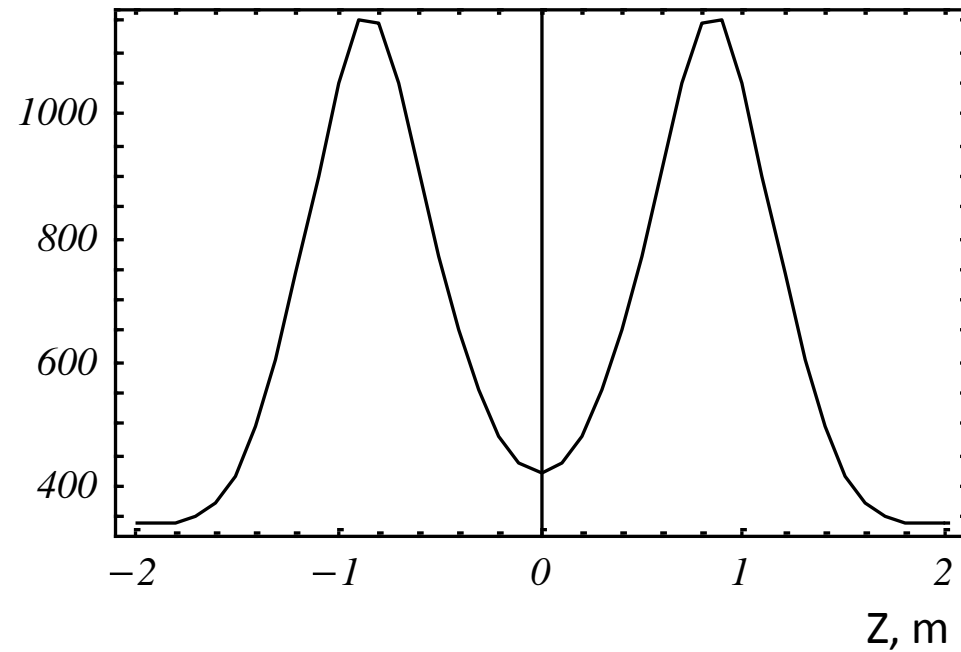


200 MeV/c, 42cm, symmetric solenoid examples

Beta, mm



“Baseline” solenoid



Exotic solenoid (very weak focusing)