

Significant Reduction in Cost and Size of the Superconducting E-lens Solenoid

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March 22, 2010

Can we get rid of most (or all) of current correctors?

- Primary purpose of the corrector system is to assure that the field lines are align to proton beam with deviation no more than 50 micron
- Currently we have room temperature correctors. They take significant space
 - Increase solenoid coil i.d. by 80-100 mm and length by ~200 mm
 - If we can get rid of all of them, solenoid i.d. could go down from 292 mm to ~200 mm and length from 2.5 meter to 2.3 meter
 - This would have significant impact on the cost
- Removing even some of them would be very helpful

Corrector System

There are two types of correctors

- Full length correctors
 - to align solenoid to proton beam
- Small length correctors
 - to correct for normal construction error

We will deal with them separately as different approach may work better for them

Full length Corrector System

- Full length correctors
 - to align solenoid to proton beam

One approach may be to align the proton beam to solenoid axis rather than solenoid axis to proton beam. This has impact on operation and Wolfram asked us to evaluate the cost benefit before going that route.

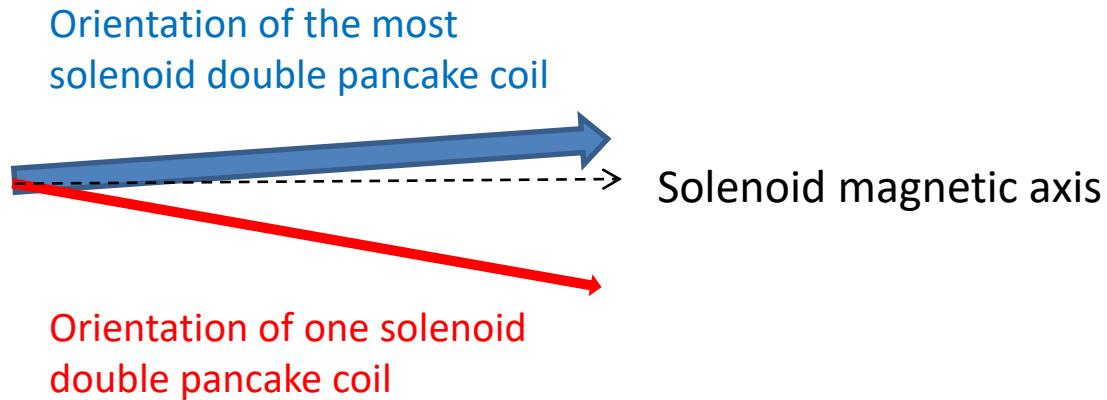
The solution presented here still try to move (rotate) solenoid axis

There are two major approaches

- Through small shunt power supplies
- Through separate superconducting corrector

Getting rid of full-length correctors (horizontal and vertical)

Approach #1: Shunt Power Supply to change field angle



One does not need too much difference in current to move end point by 50 micron
Outermost coil has extra margin, that could run at higher current and starting position
can have an off-set

Example:

- 5 pair of coils aligned to the axis
- 1 pair off-axis by 1 mm