Optimizing EIC tracker configuration

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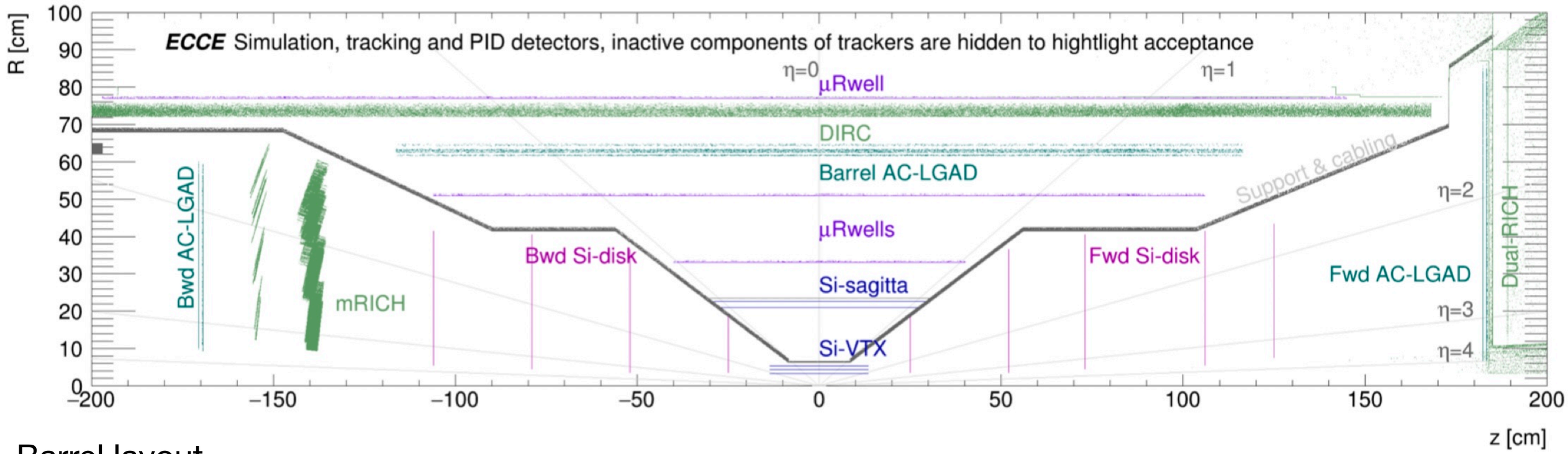
RNC EIC Meeting
June 28th, 2022

Barrel

The ECCE configuration



Barrel layout

Si	r (cm)	length (cm)	X
1	3.3	27	0.05
2	4.35	27	0.05
3	5.4	27	0.05
4	21	54	0.05
5	22.68	58	0.05

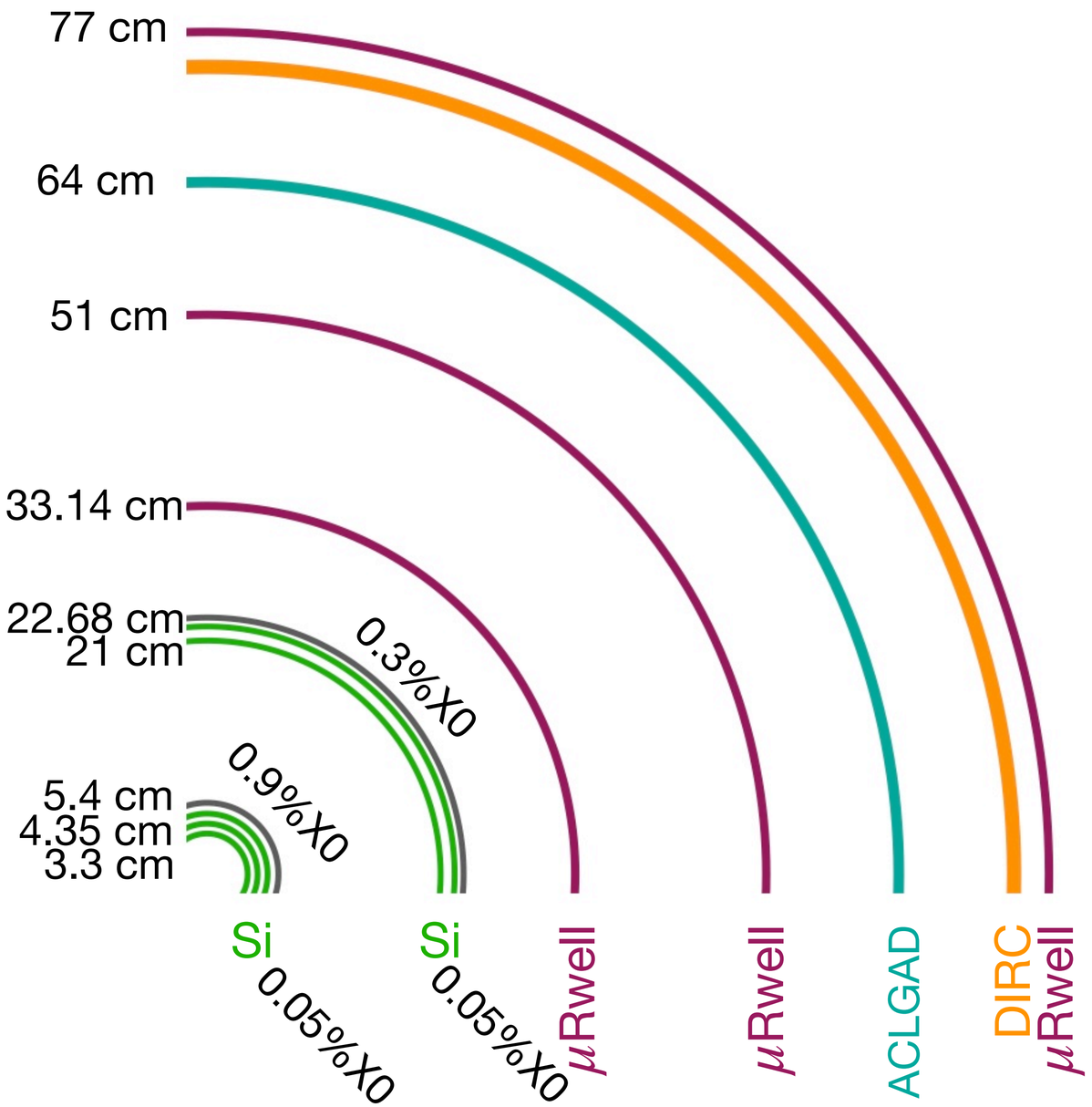
→ Pitch = 10 um

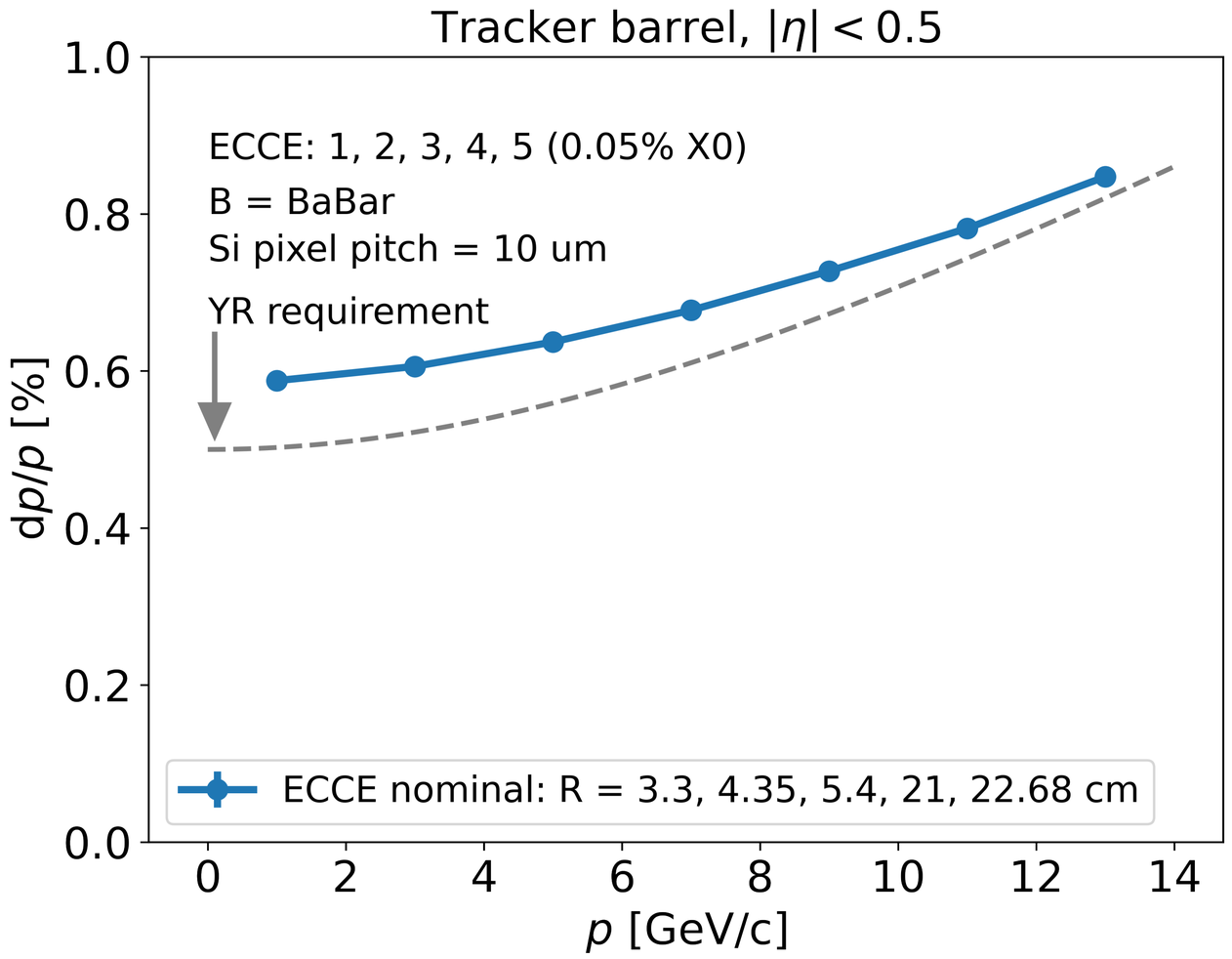
	r (cm)	length (cm)	point res
uRwell1	33.14	80.16	55 um
uRwell1	51	212	55 um
ACLGAD	64	140	30 um
uRwell3	77.0175	342	55 um

And also two support cylinders:

- r = 6.3 cm, 0.9% X0
- r = 23.5 cm, 0.3% X0

Momentum resolution performance of ECCE Barrel



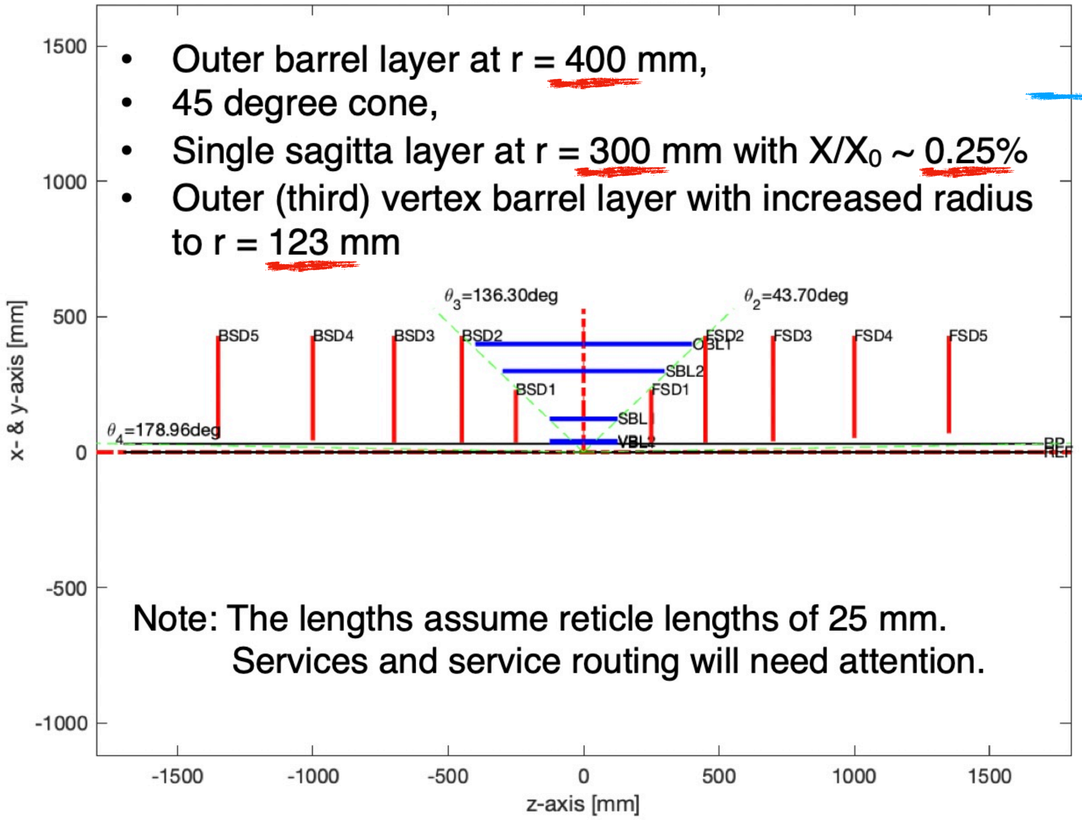


Barrel optimization with fast simulations

Work by E. Sichtermann

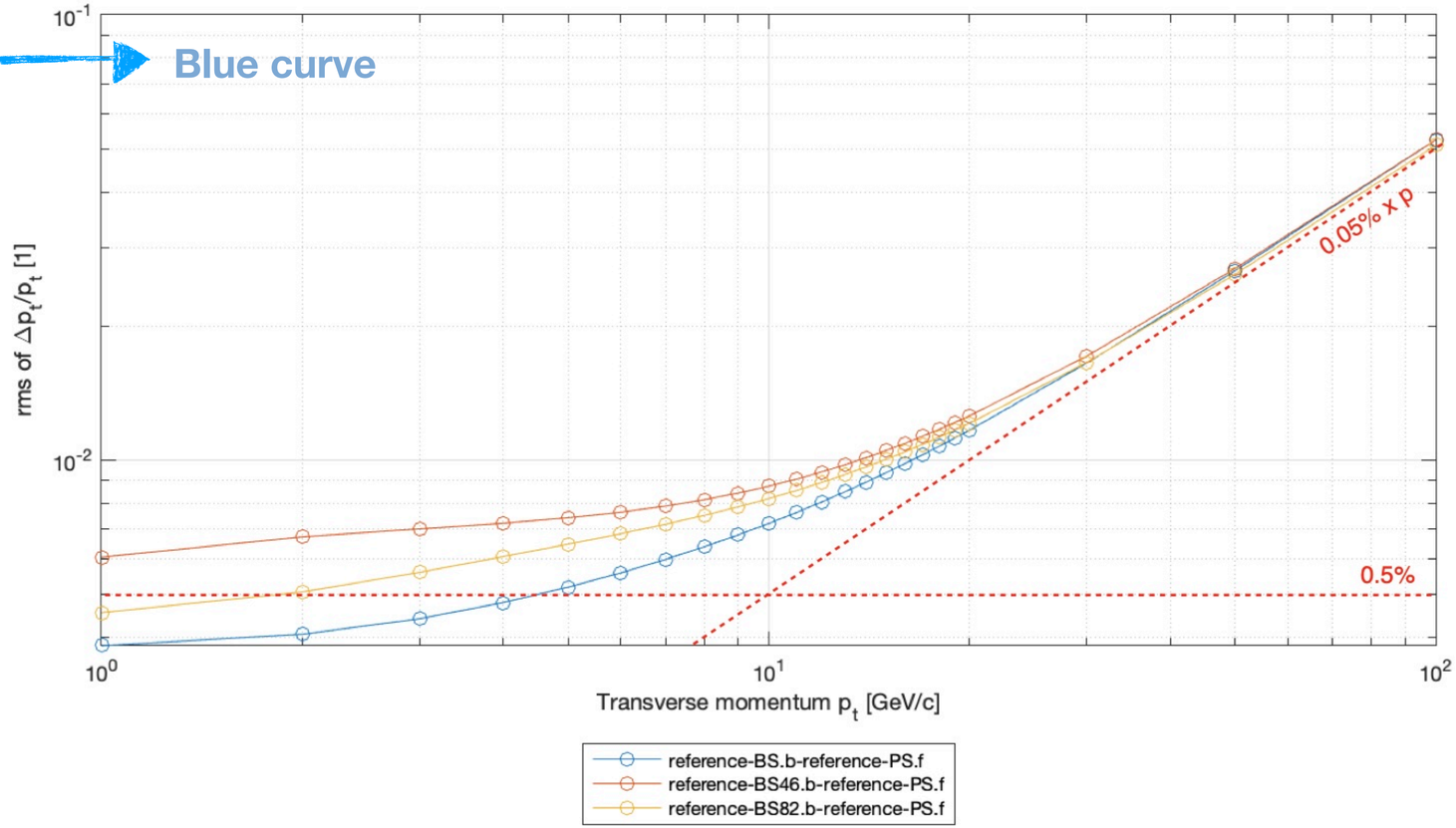
See slides from https://conferences.lbl.gov/event/974/

- Outer barrel layer at r = 400 mm,
- 45 degree cone,
- Single sagitta layer at r = 300 mm with $X/X_0 \sim 0.25\%$
- Outer (third) vertex barrel layer with increased radius to r = 123 mm



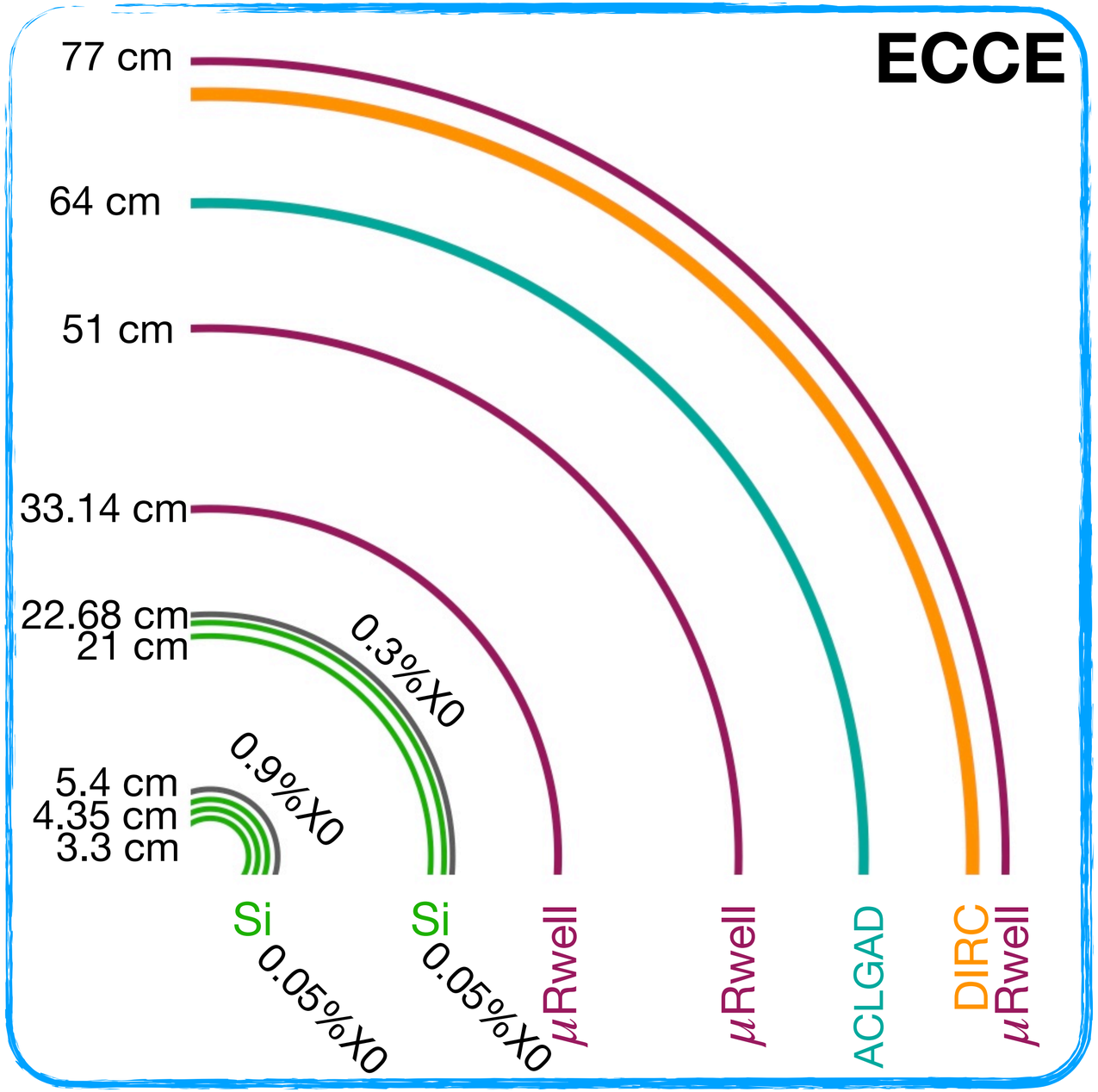
Note: The lengths assume reticle lengths of 25 mm.
Services and service routing will need attention.

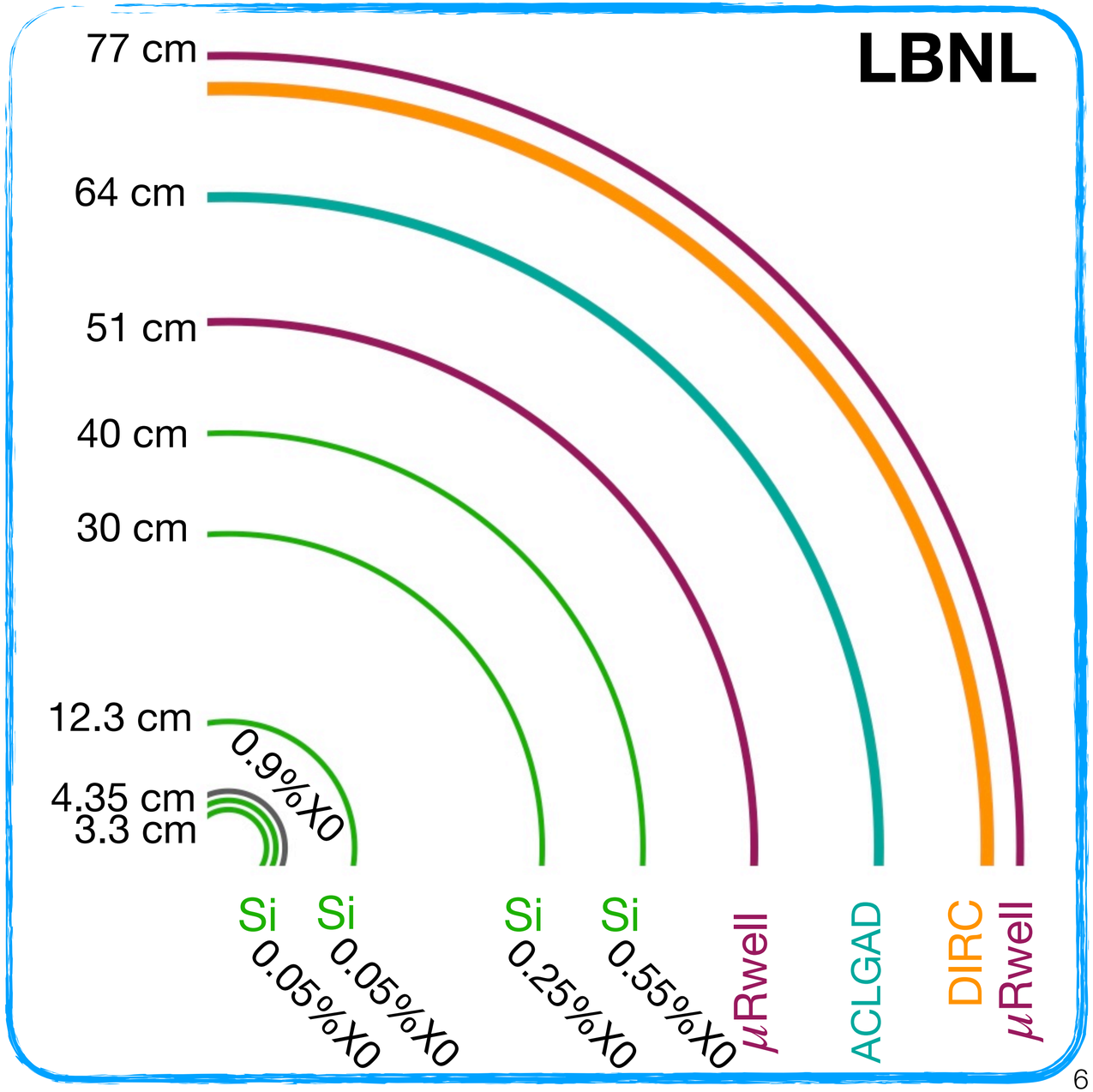
Blue curve



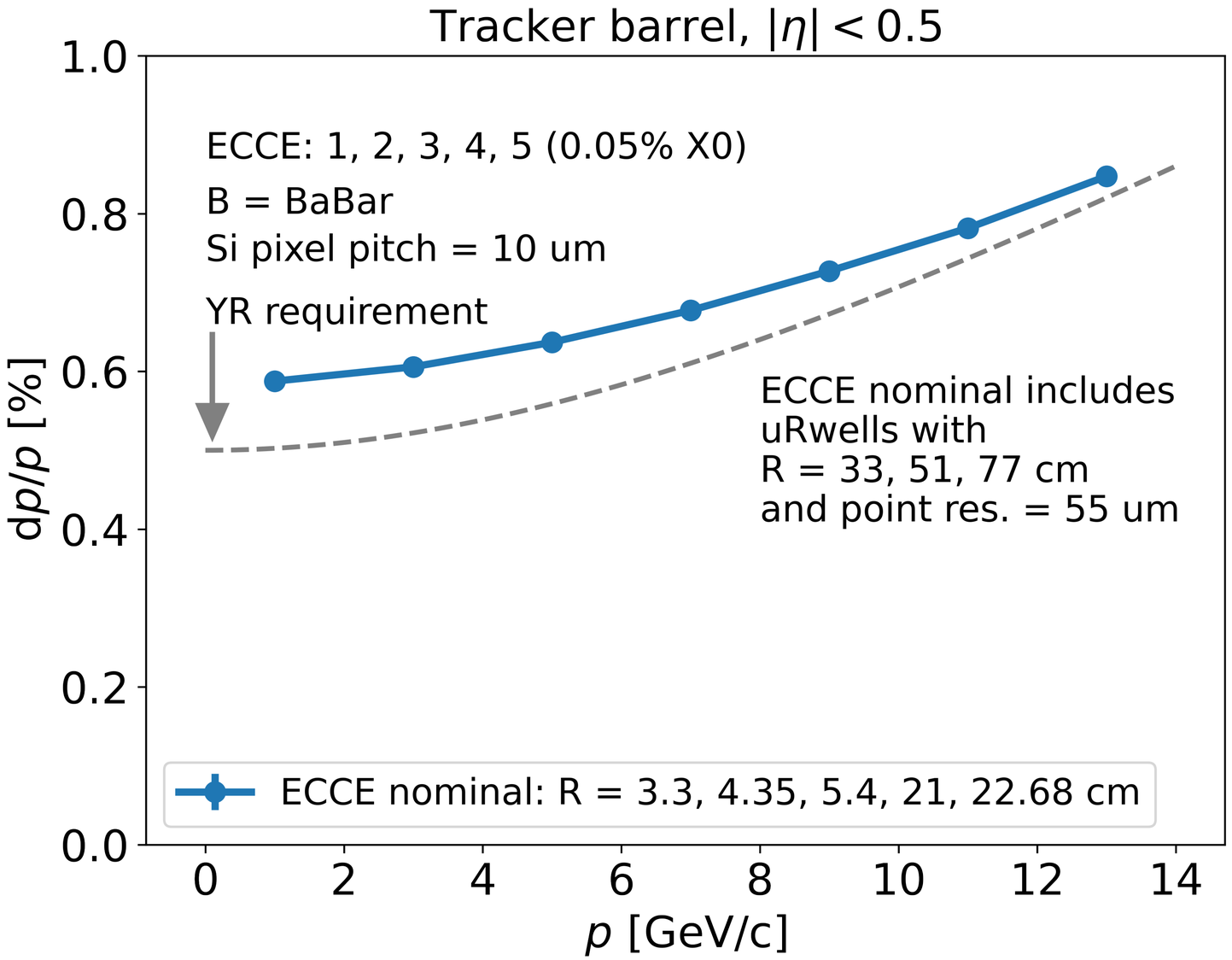
It seems sensible to simulate this in Fun4All already now, even though other changes will be needed. Volunteers ;-)?

New proposed barrel configuration

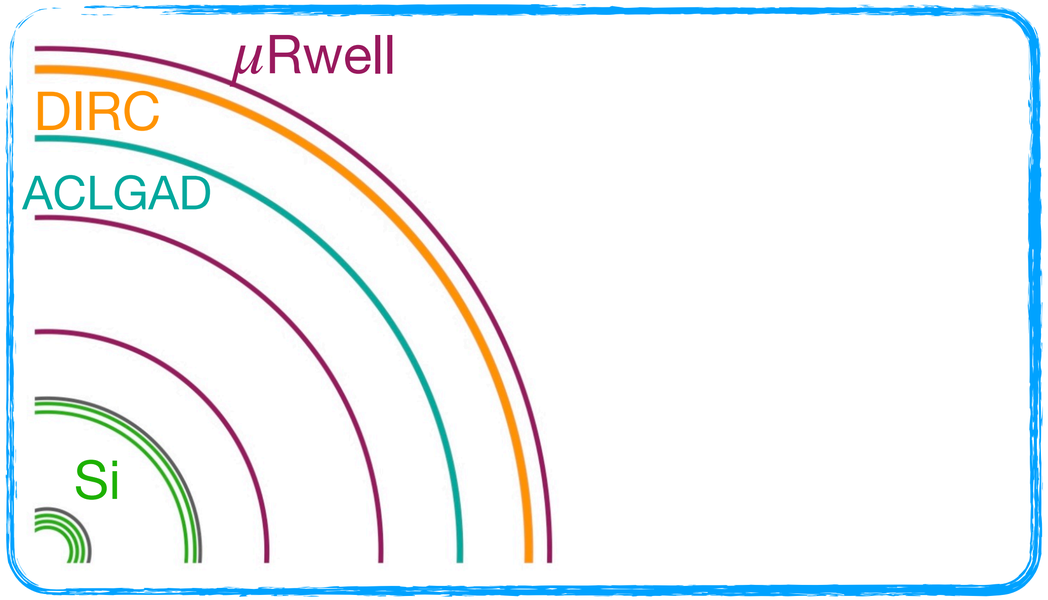




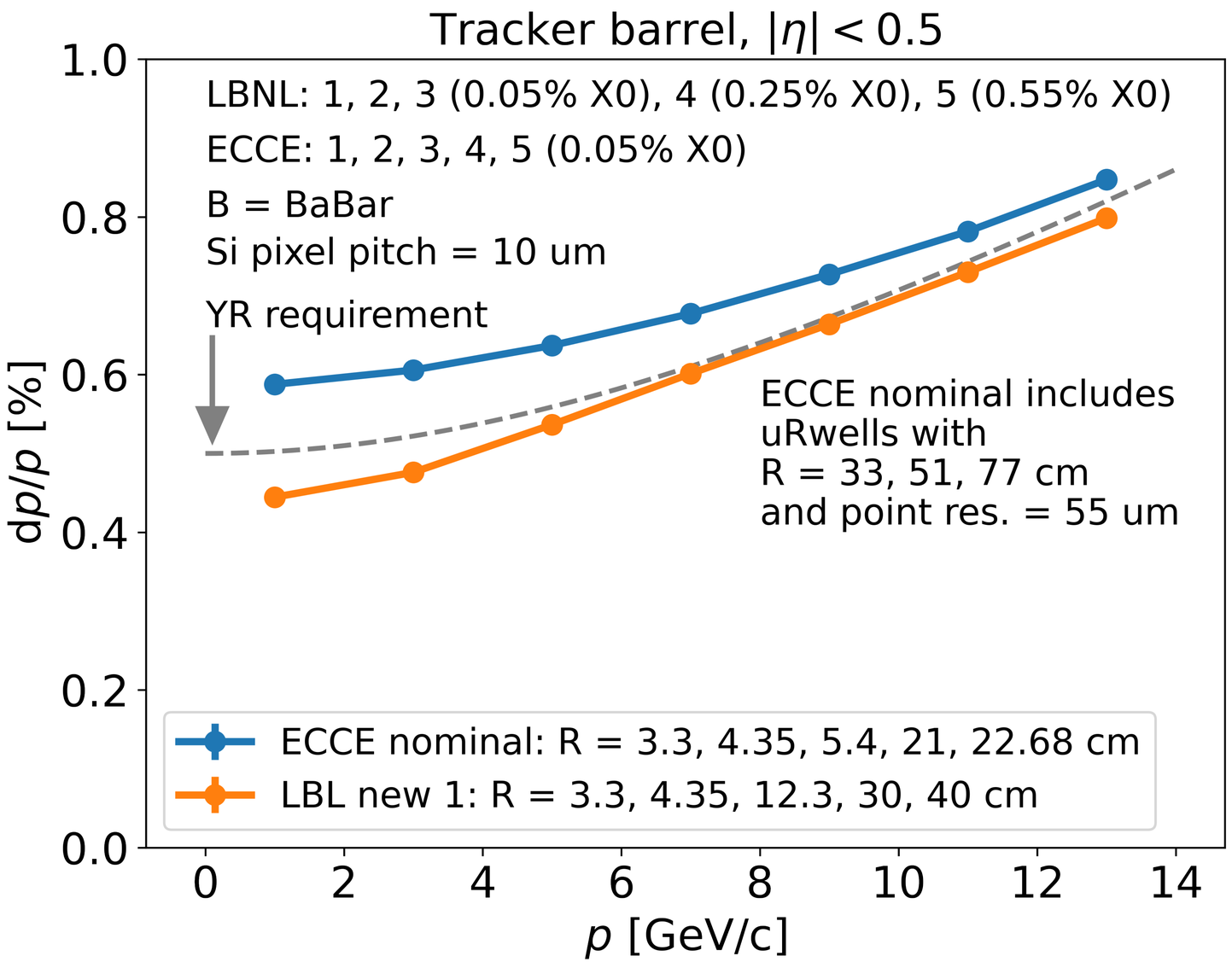
Momentum Resolution Performance



ECCE nominal configuration



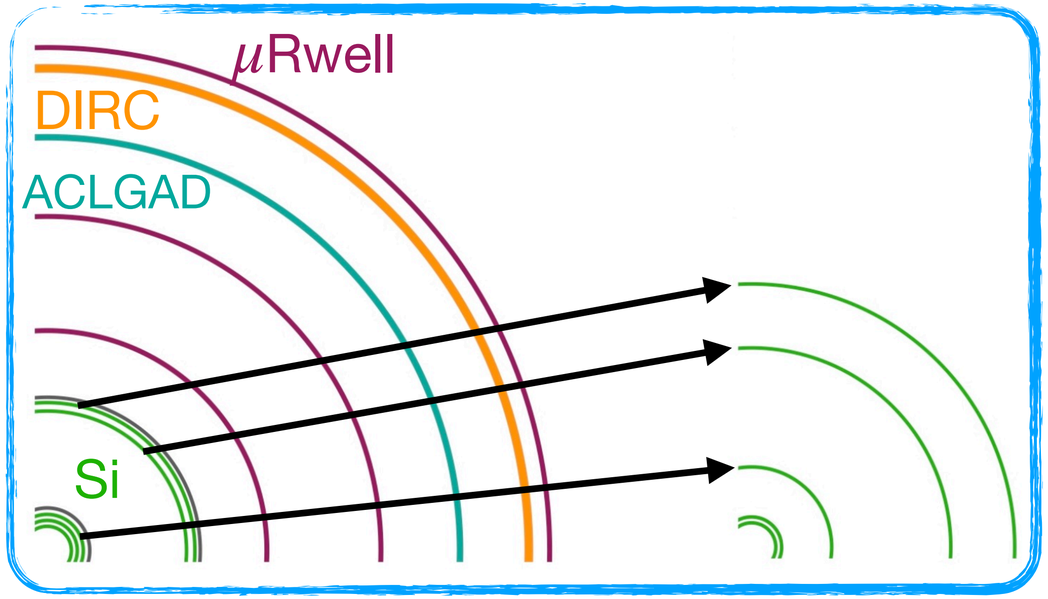
Momentum Resolution Performance



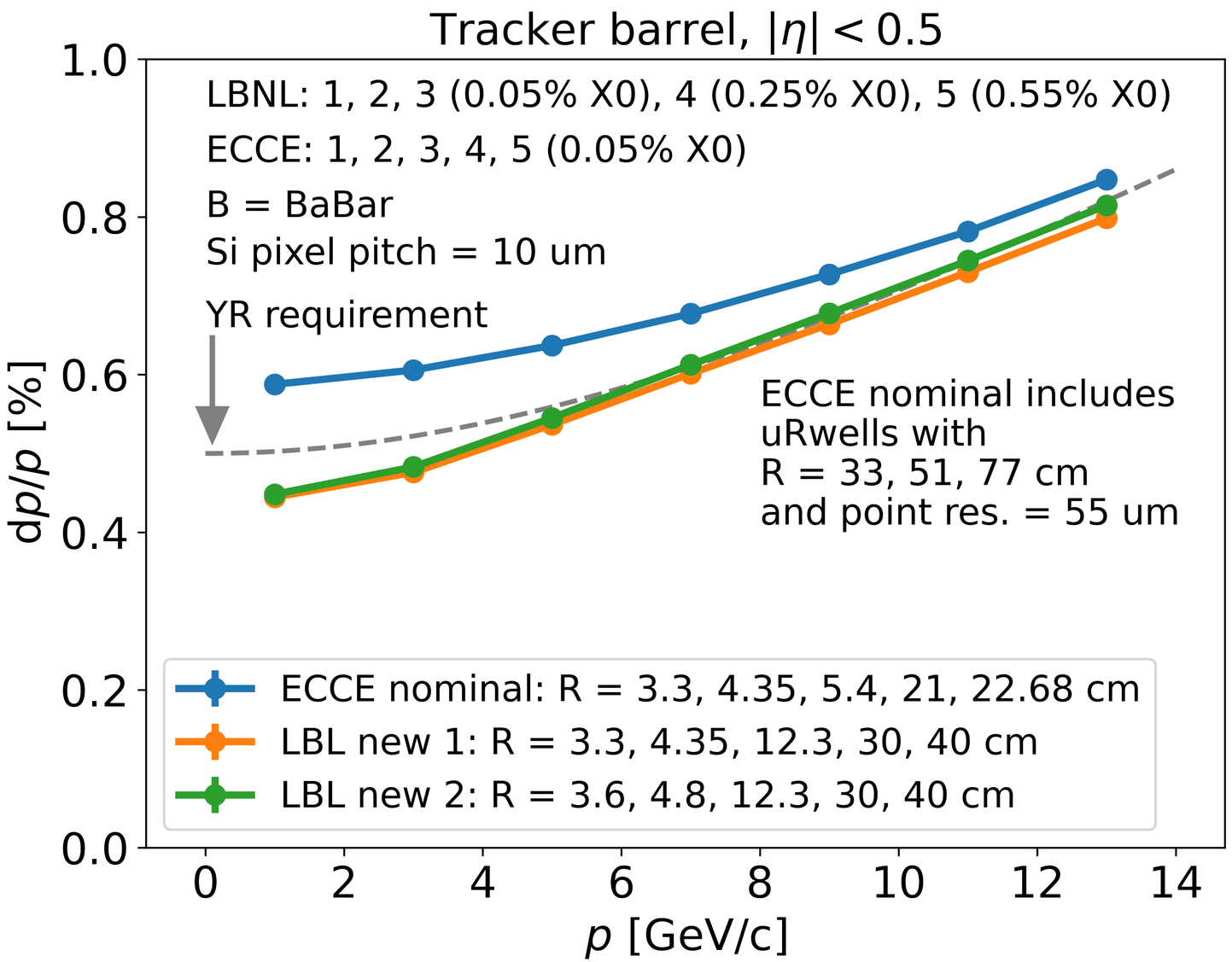
ECCE nominal configuration

LBL (Ernst's) configuration:

after increasing R of third vtx layer and sagitta layers (and changing X)



Momentum Resolution Performance



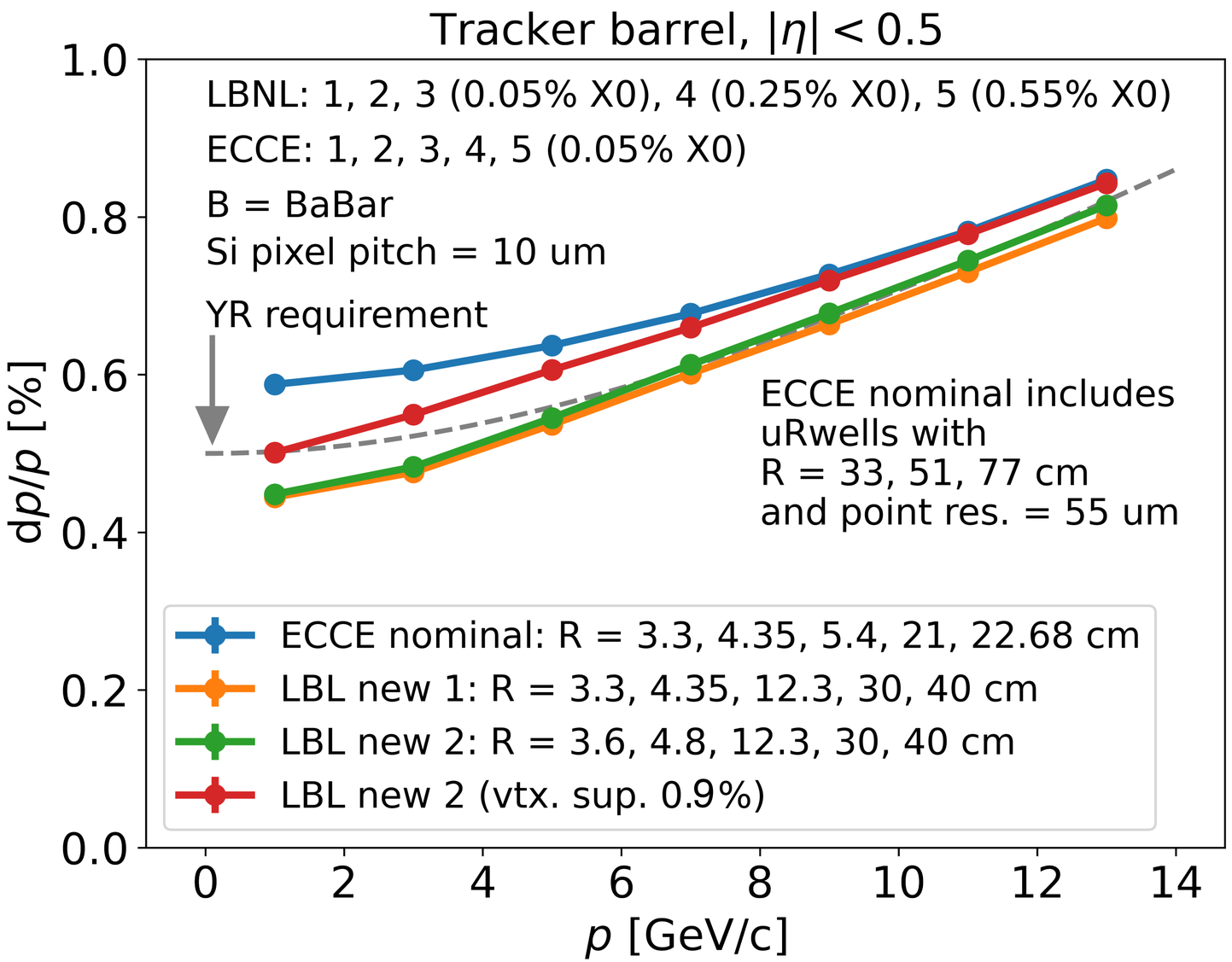
ECCE nominal configuration

LBL (Ernst's) configuration:

after increasing R of third vtx layer and sagitta layers (and changing X)

after also increasing R of two innermost vtx layers (for beampipe bakeout)

Momentum Resolution Performance



ECCE nominal configuration

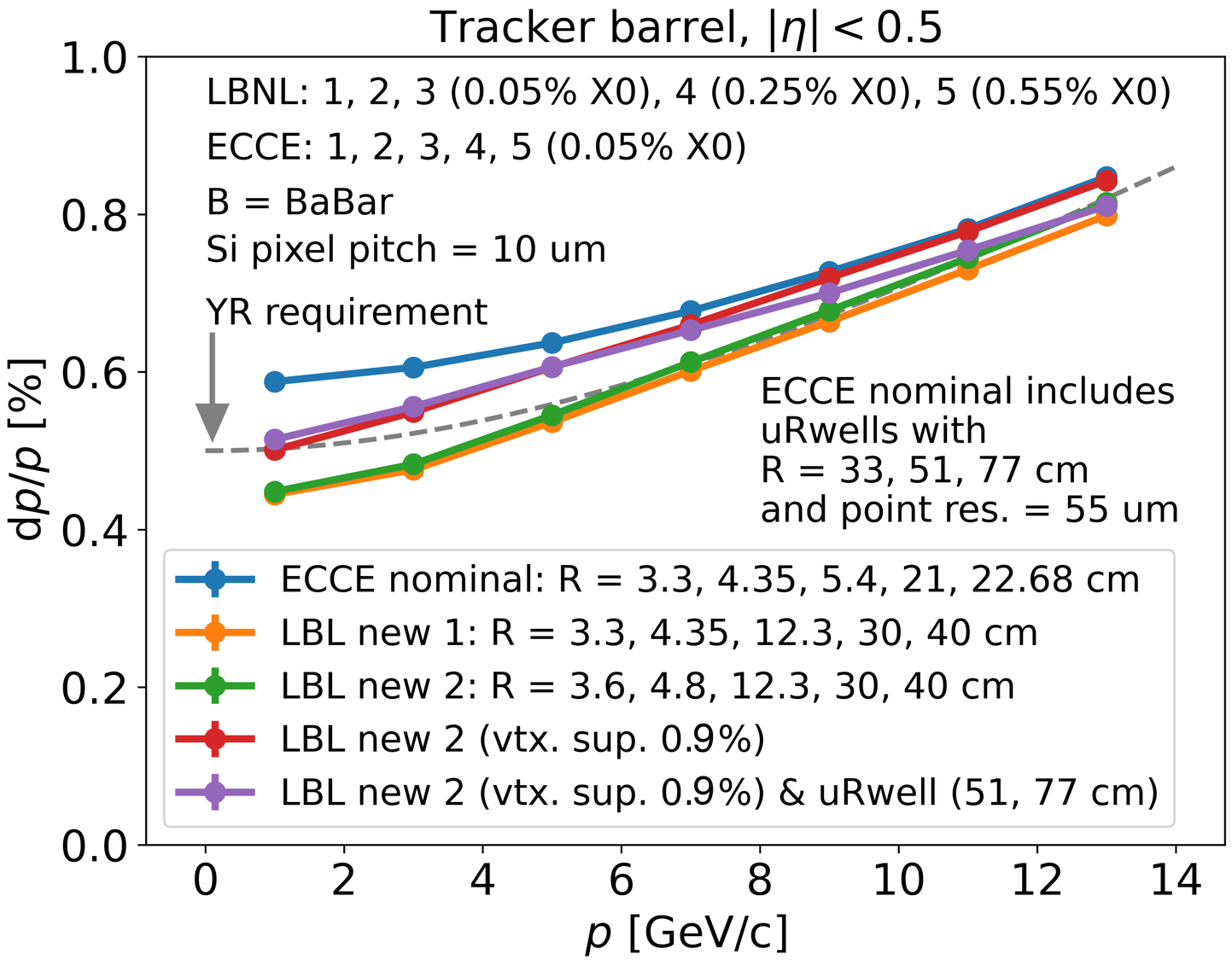
LBL (Ernst's) configuration:

after increasing R of third vtx layer and sagitta layers (and changing X)

after also increasing R of two innermost vtx layers (for beampipe bakeout)

after adding 0.9% X0 cylinder outside vtx layers

Momentum Resolution Performance



ECCE nominal configuration

LBL (Ernst's) configuration:

after increasing R of third vtx layer and sagitta layers (and changing X)

after also increasing R of two innermost vtx layers (for beampipe bakeout)

after adding 0.9% X0 cylinder outside vtx layers

after turning on outtermost two uRwells