

Iteration on length of high order correctors

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LAYOUT

Iteration on the corrector strength is needed

Summary of strength used in the baseline

Multipole	Intgrated gradient (T m)	(units)	Magnet length (m)
a ₂	1.000	50	0.841
a ₃ , b ₃	0.063	3	0.123
a ₄ , b ₄	0.046	2.2	0.990
a ₅ , b ₅	0.025	1.7	0.107
b_6	0.086	3.2	0.449
a_6	0.017	0.8	0.102

- Larger a₄, b₅, M. Giovannozzi team shows that we are at 87% of the nominal force for order 4 and 5
- Best estimates of field quality are based on 3 short models
 - We see large values of a4 and b5 about 2-3 times larger than our tables
- We shoud act now no time to have ore data from long models



LAYOUT

- Explored possibilities
 - <u>https://indico.cern.ch/event/707076/</u> (February 2018)
 - 50% more current to get 30% more strength
 - Viable, but does not look as best option: much lower margin, and limited effect
 - 30% more length to get 50% more strength
 - Protection ok, 320 mm more in the cold mass if we also increase order 3
 - Decision by April, call for tender for series is being prepared (contract to be signed in January 2019)
 - Impact on costs is less than 5%, for the moment in the noise



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LAYOUT

Where to find the 320 mm?

- 120 mm found from optimization of the lay-out
- Option of a shorter skew quadrupole
 - 200 mm less in the skew quad would mean correcting 35 units instead of 50
- Iteration on the strength of the skew corrector is ongoing (WP2)
 - Today in the LHC we can correct up to 39 units, and we use the magnets at 40% of maximum current (we correct 16 units)

Decision to be taken soon (April): Lasa is writing the invitation to tender

_	Corrector strength	(units at 17 mm) LHC	(units at 23 mm) LHC	(units at 50 mm) HL-LHC
	a_2	39	39	50
1050 950 E sco	b ₃	1.1	1.5	3.0
■ baselin ■ baselin ■ baselin ■ baselin ■ -200 m ■ -300 m ■ -350 m ■ -350 m ■ -350 m ■ -350 m	nm a.	1.8	2.5	3.0
± 550 ± 550 ↓ 450	a_{1}, b_{2}	0.8	1.5	2.2
350 -•-Serie6 250 -• Serie7	a_5, b_5	-		1.7
100 150 200 Series Current [A]	b ₆	0.8	2.8	3.2
Hilumi	a ₆	-		0.8
HL-LHC PROJECT	-			E. Tod

A FURTHER POSSIBLE DEVELOPMENT

- The dependence on the current is highly non linear due to saturation
 - If we could work with 25 units correction (half of the strength of what we have today) this would open to door to have 120 A circuits, and no dump



