Multipolar content of triplet magnets

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THE PROBLEM

- We have observed in few model large values for the a_4 and b_5 due to geometric field errors
  - These components are present already in the room temperature measurements [see S. Izquierdo Bermudez at HL LHC meeting in Paris 2016]
  - MQXFS1: a_4 of -6.5 units, b_5 of 2.8 units
  - MQXFS3: a_4 of 3.7 units, b_5 of -3.2 units

THE PROBLEM

- Caveat: early phase of short models, different coils, field quality shold improve
  - But we have no understanding of the origin
  - And we also saw similar values for HQ (large a_4 and b_5)
  - These multipoles go above the possibility of correction with the magnetic shimming (max 0.8 of a_4, b_5 cannot be corrected since magnetic shimming acts on order 3 and order 4)
  - Today we have a random and uncertainty a4 and b5 of 0.57 and 0.42 units respectively (one sigma)
  - I would suggest to see the impact of increasing these values by a factor 2, 3 and 4