

Follow-up on the Dynamic aperture studies for MQM quadrupole magnets

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- Latest results from numerical simulations for MQM quadrupole magnets
- Status of measurements for insertion quadrupoles
- Progress on studies for MQY quadrupoles

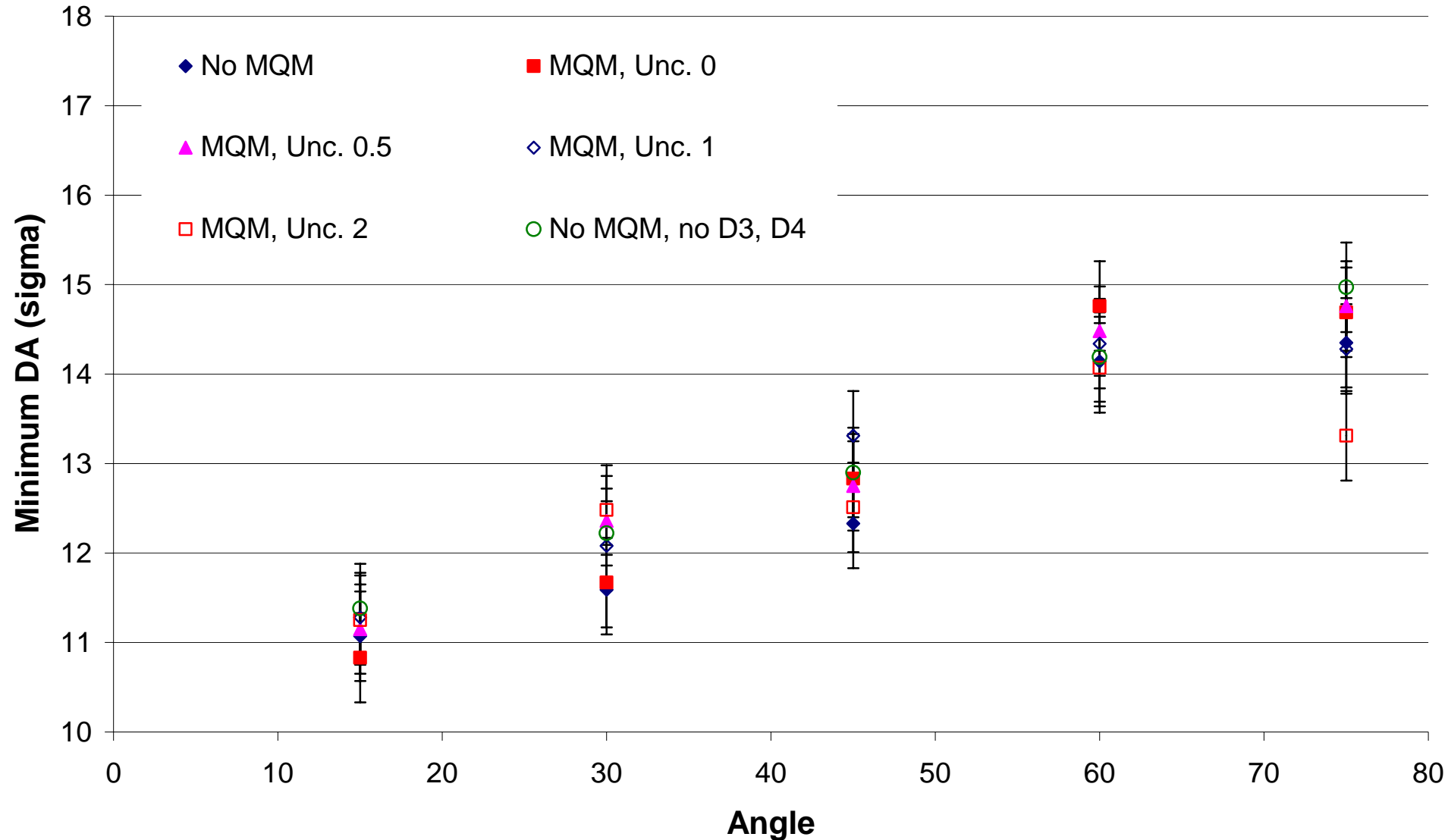
Summary of studies for MQMs (from LOC meeting 08/02/05)

- Minimum DA with measured field quality is 10.8σ
- Almost no dependence on systematic multipoles, but b_7 when b_n is changed by ± 2 units around measured systematic value.
- Based on previous observation, an uncertainty of 1 unit (corresponding to a variation of b_n of ± 0.5 units) has been assumed.
- Tracking with such field quality, i.e. measured multipoles+uncertainty, done: results to be analysed.
- Tracking taking into account hysteresis effects to be done.
- Effect of beam screen?

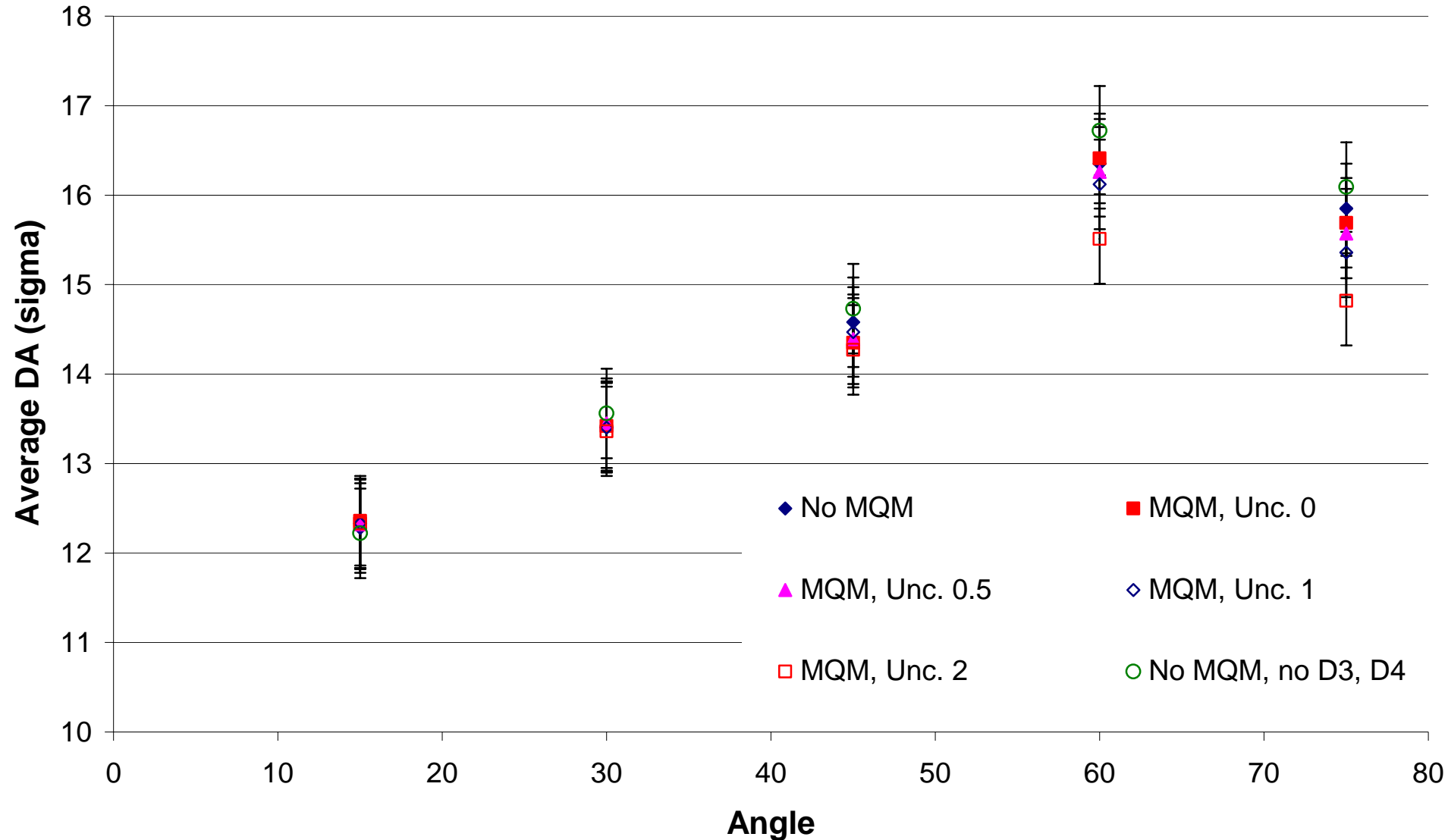
New tracking studies - I

- Tracking setting-up:
 - Injection energy
 - Measured errors in MBs
 - Target errors for MQs (AL)
 - Shift of b_6 for MQs in two sectors
 - New measured error tables for MQWs (based on measurement results of 22 MQWs)
 - Expected error tables for cold D1s, D2s, D3s and D4s
 - New signs for the error routines (AL)
 - Initial field quality for MQMs: measured multipoles (systematic and random)

MQMs tracking results - I



MQMs tracking results - II



Summary of tracking results for MQM-like quadrupoles

- Minimum DA for errors in MBs, MQs, MQWs, cold D1s, D2s: **11.38**
- Minimum DA for errors in MBs, MQs, MQWs, cold D1s, D2s, D3s, D4s: **11.07**
- Minimum DA for errors in MBs, MQs, MQWs, cold D1s, D2s, D3s, D4s, MQM: **10.83** (uncertainty=0)
- Minimum DA for errors in MBs, MQs, MQWs, cold D1s, D2s, D3s, D4s, MQM: **11.28** (uncertainty=1)

Status of measurements for insertion quadrupoles

● MQM-like quadrupoles

- Results of geometrical measurements are not yet available under MTF
- Results of warm magnetic measurements are available under MTF

● MQY

- Results of geometrical measurements are not available under MTF
- Results of warm magnetic measurements are not available under MTF.
- A large fraction of the production is affected by out-of-spec magnetic permeability of the laminations: this is supposed to affect in particular low-order multipoles. Hence warm measurements are not believed to be representative of the actual field quality
- Cold magnetic measurements should start soon in Block4: information on the time-dependence of the gradient was required to optimise the measurement strategy
- Preliminary results on "dangerous" multipoles for MQYs were communicated to AT link-person

Progress on studies for MQY quadrupoles

- Target field quality will be determined starting from measured multipoles (same approach as for MQMs):
 - Scan over skew multipoles
 - Scan over normal multipoles
- Present status: scan over a_3 , a_4 , a_5 completed.
- NB: tracking studies are now performed using LSF, CPSS and even BOINC.

MQY (geometric at 17 mm, units) $b_6(\text{persistent at inj})=-1.6$			
b_n	σ_{bn}	a_n	σ_{an}
-0.02	1.13	-0.10	0.60
0.03	0.16	0.00	0.31
0.01	0.17	-0.01	0.18
1.22	0.22	-0.16	0.07
-0.01	0.02	0.00	0.02
0.03	0.05	-0.01	0.04
0.01	0.01	0.00	0.01
-0.37	0.01	0.01	0.01

See **LHC-PR 735**