Research supported by the High Luminosity LHC project

HiLumi LHC
Study of DA at Injection

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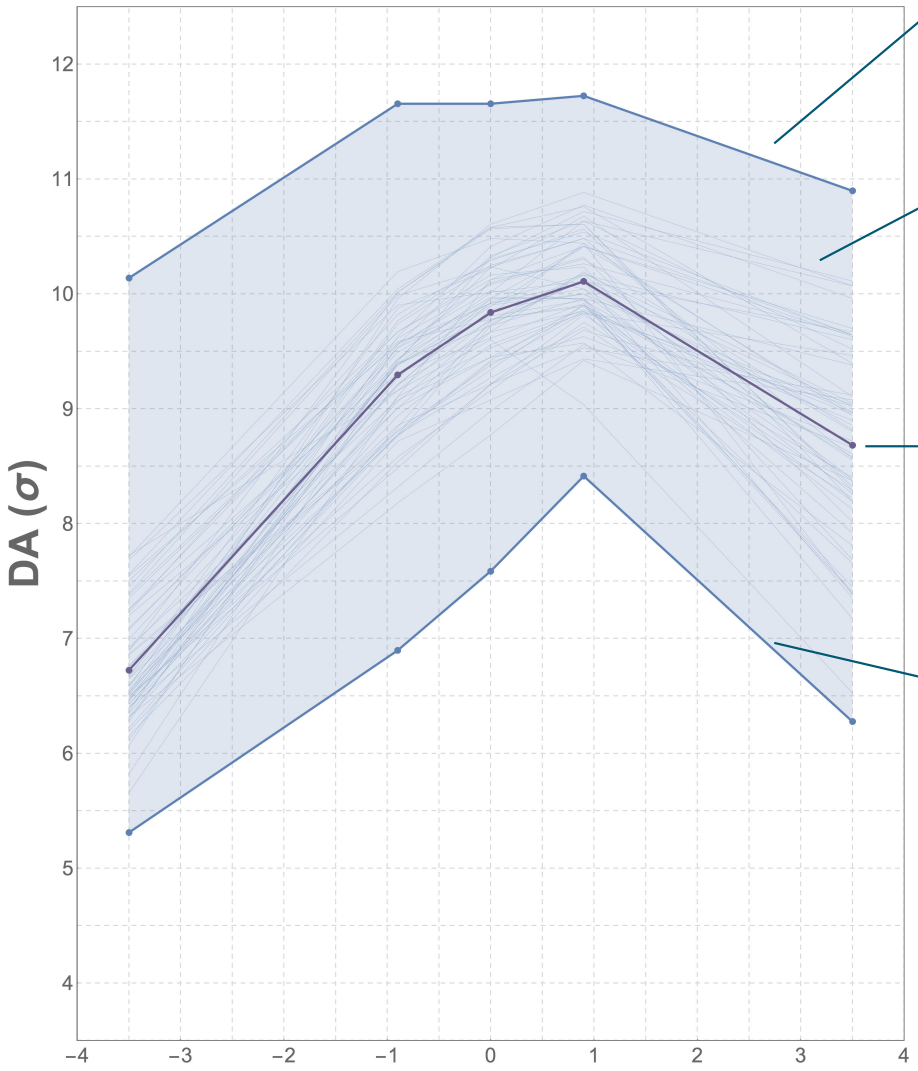
Setup

- Baseline study is HL-LHC V1.0 (slhc/hllhc_sequence.madx) with injection optics (slhc/opt_inj_thin.madx), and with the following errors assigned (all files in slhc/errors2/):
  - Triplet with fringe fields (Efcomp_MQXFbody.madx, Efcomp_MQXFends.madx, ITnc_errortable_v5, ITcs_errortable_v5 and ITbody_errortable_v5)
  - MCBXF (Efcomp_MCBXFAB.madx and MCBXFAB_errortable_v1)
  - D1 (Efcomp_MBXAB.madx and D1_errortable_v1)
  - D2 (Efcomp_MBRD.madx and D2_errortable_v5)
  - Q4 (Efcomp_MQYY.madx and Q4_errortable_v2)
  - Q5 (Efcomp_MQYL.madx and Q5_errortable_v0)
- DA calculated over 5 angles and 60 seeds, during 10^5 turns.

Example DA plot



absolute maximum
(maximum angle over all seeds)

individual seed lines
(average over angles per seed)

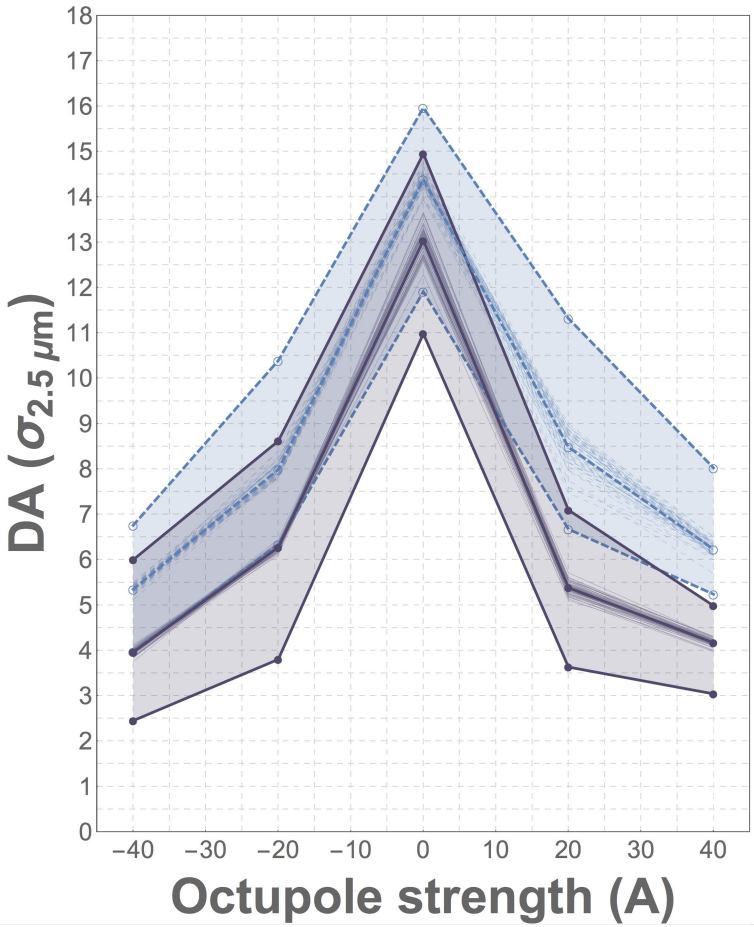
average DA
(average over angles and over seeds)

absolute minimum
(minimum angle over all seeds)

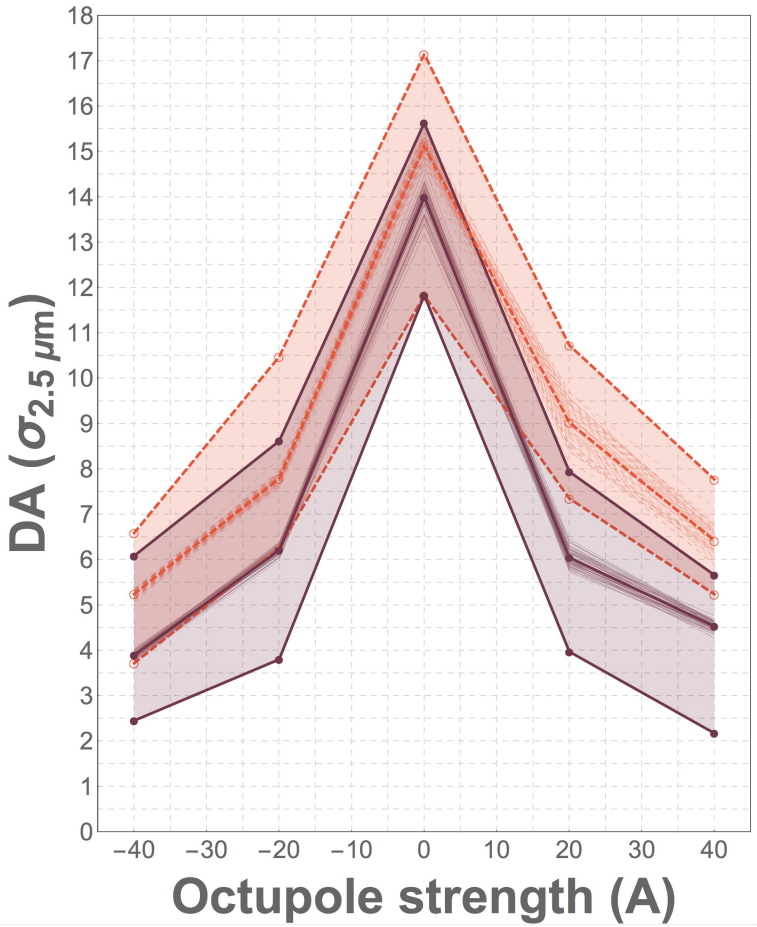
DA for the nominal HL–LHC at injection

$E = 450$ GeV
$\varepsilon_n = 2.5\ \mu$m
$\beta_1^* = 6$ m
$\beta_2^* = 10$ m
$\beta_5^* = 6$ m
$\beta_8^* = 10$ m
$\theta_c^{1,5} = 590$ mrad
$d_{sep}^{1,5} = 4$ mm
$Q_x = 62.28$
$Q_y = 60.31$
$\mu_x^{1\to5} = 31.195$
$\mu_y^{1\to5} = 30.368$
$\phi_1 = 90°$
$\phi_5 = 0°$

Beam 1



Beam 4



Chromaticity: 3
Chromaticity: 20

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