Update on collimation optics

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To be done on collimation optics before Rome :

Design and consolidation of option 1 for collimation.

Option 1 :

- Extraction followed by betatron collimation for beam 1
- Momentum collimation for beam 2.

- Preparation of different options for momentum collimation optics : optics scaled from LHC momentum collimation section or new optics based on fodo cells.

- Exploration of different possibilities for dispersion management in momentum collimation section (matching, chicane optimisation, phase advance tuning).

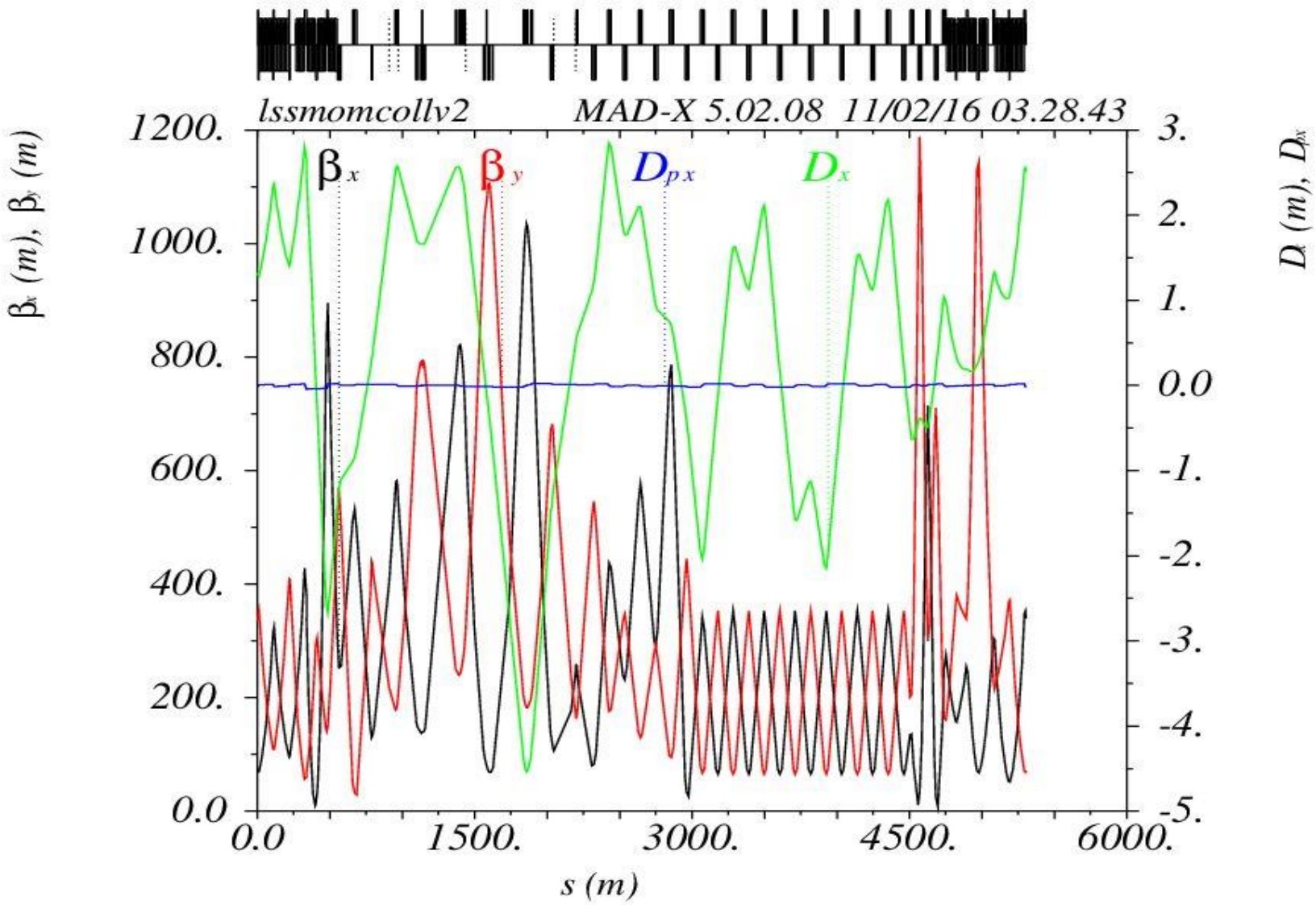
- First study of integration of 2 beams with their layout. Addition of dog-leg if needed to optimise beam separation, according to integration possibilities.

- Writing of a note before Rome's FCC week to summarize option 1.

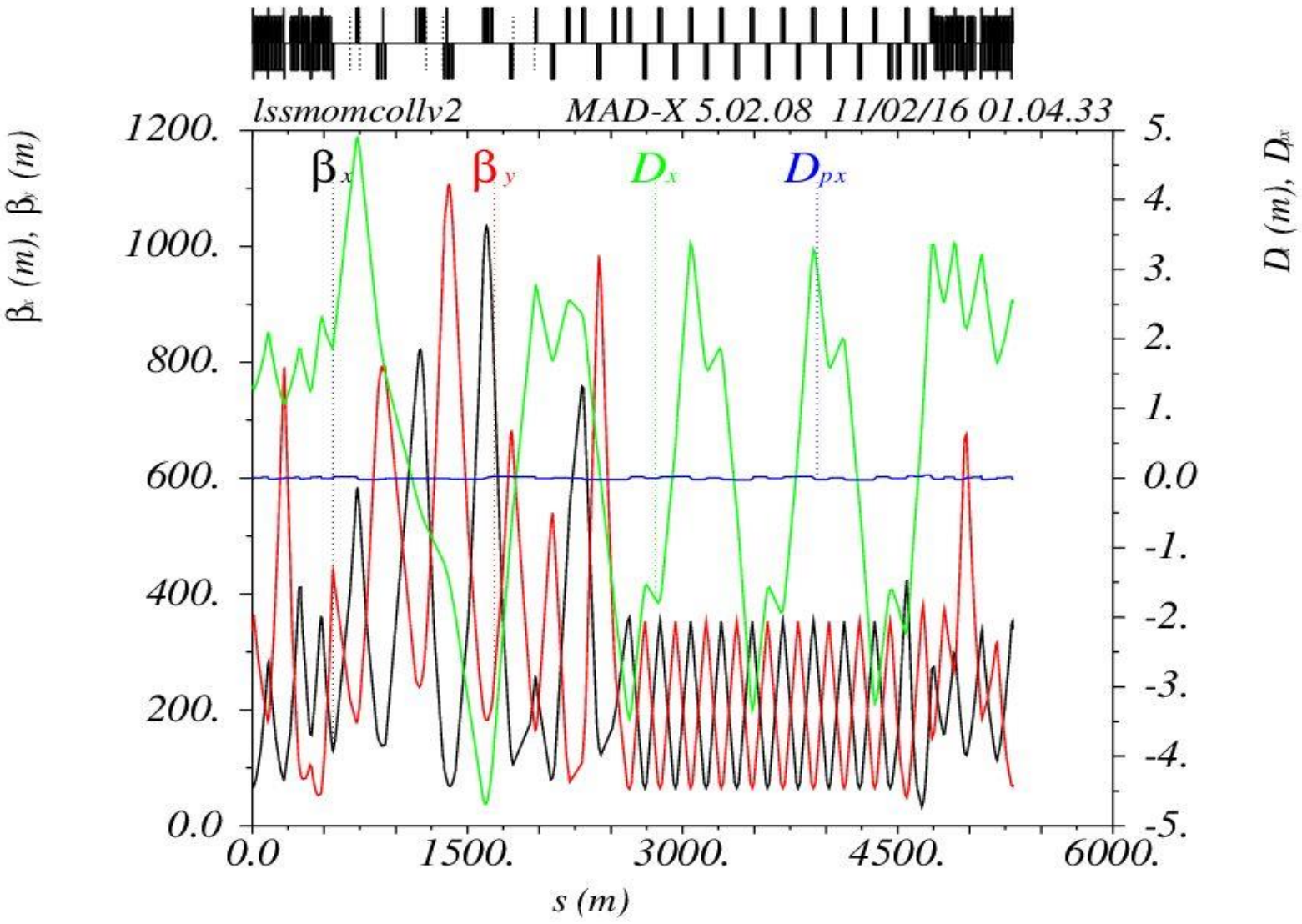
Momentum collimation optics

Development of new version based on LHC momentum collimation optics scaling.
scaling factor of sqrt(50/7) = 2.67.
2 versions have been prepared : one with same dispersion than LHC (2.2m) and one with larger dispersion than LHC (3.8m).
Fodo canal has been added to increase the length up to 4.2km.
Collimator installed at same place than LHC (with beta function multiplied by 2.67)
NO additional dipoles for dispersion management : pure straight section for easier integration.

Momentum collimation optics



Momentum collimation optics



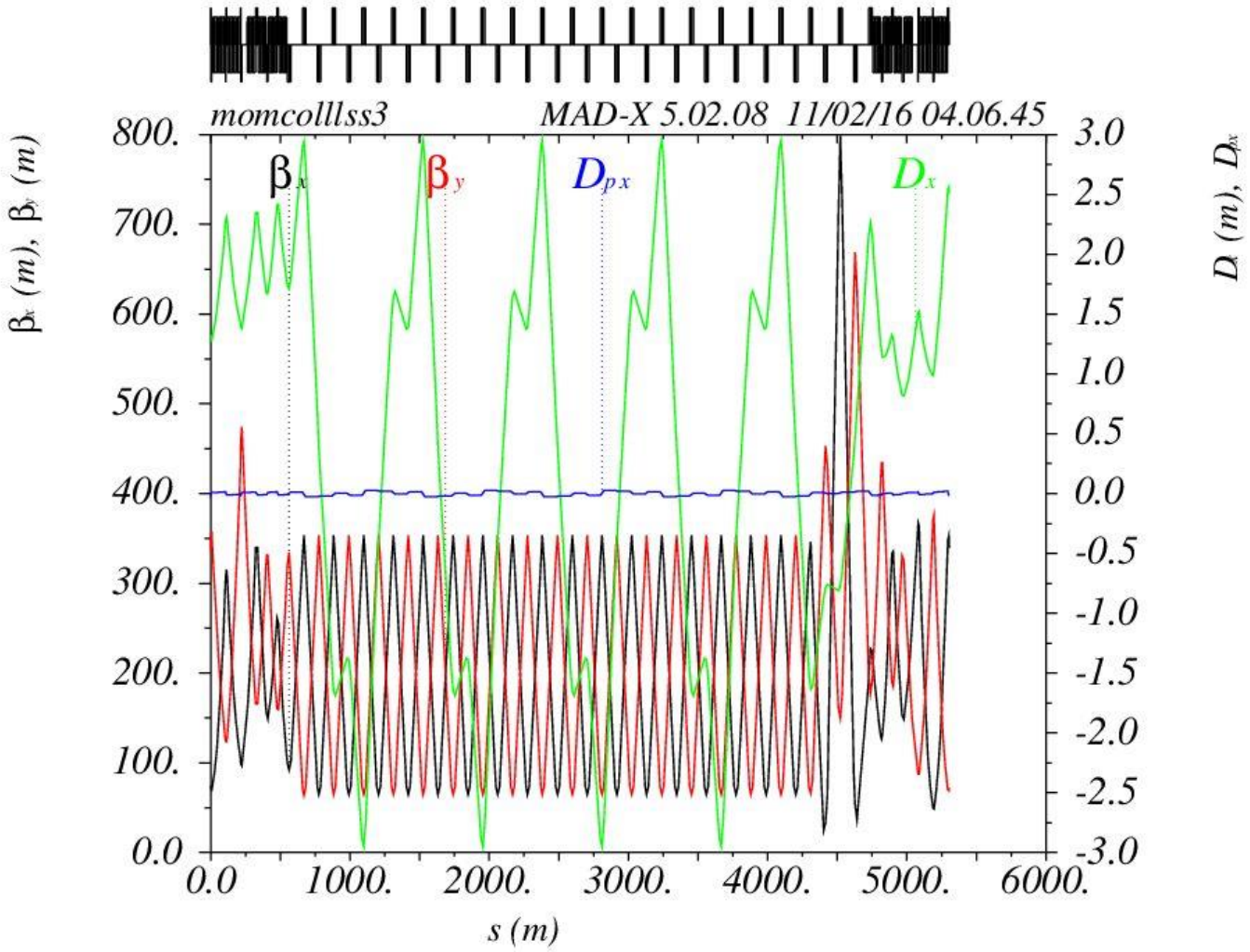
Momentum collimation optics

Improved versions based on fodo canal have been developed : aim is to improve the dispersion management by different ways : fodo cells phase advance change and dispersion suppressor quads strength matching.

Dispersion and beta function peak into fodo cells depend on cells phase advance : smaller phase advance leads to higher dispersion without change on beta function.

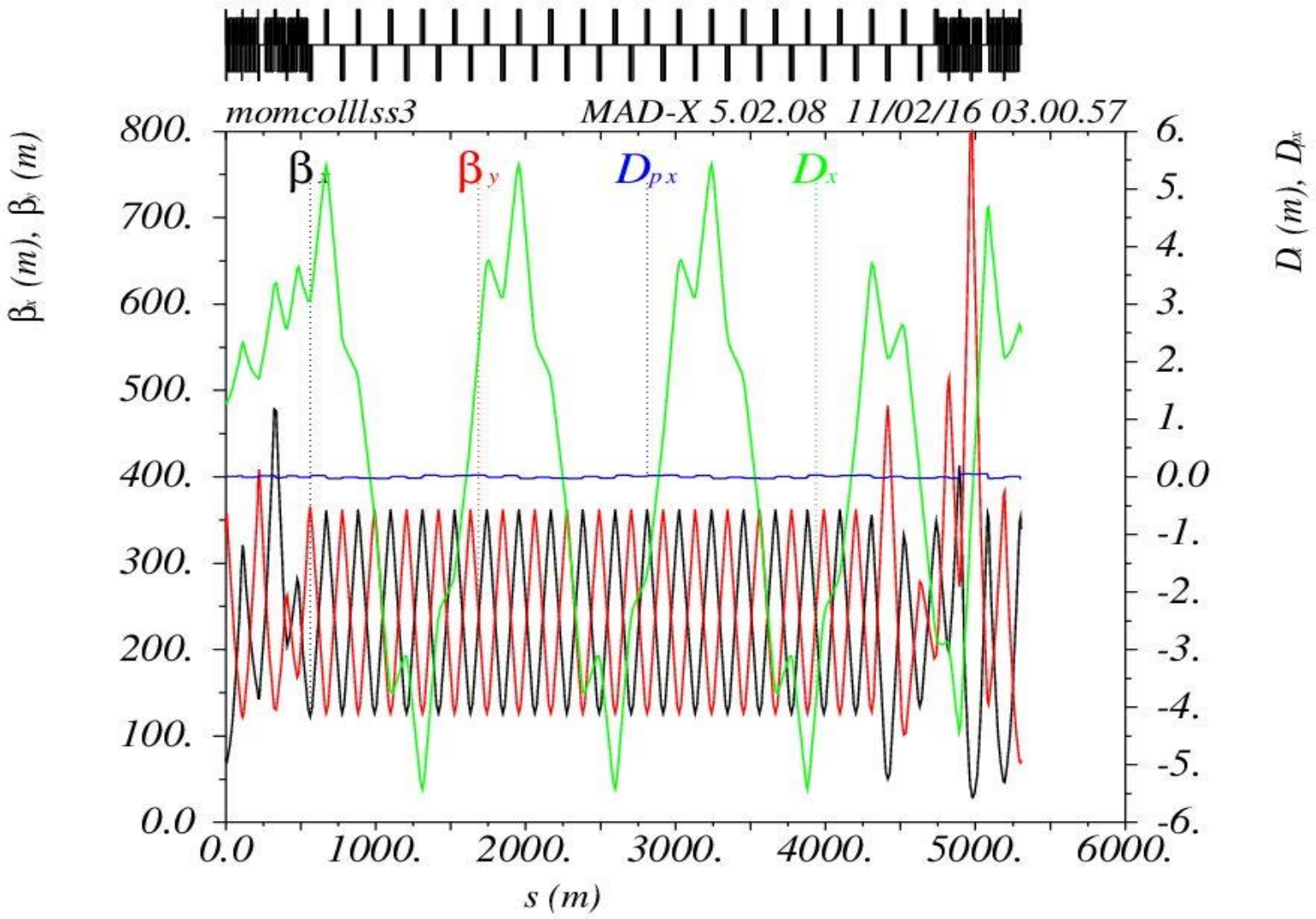
Momentum collimation optics

« Basic » version using 90° fodo cells with warm quads and natural dispersion coming from arcs without any matching or additional dipoles.
Dispersion at location of primary collimator is 2.7m.



Momentum collimation optics

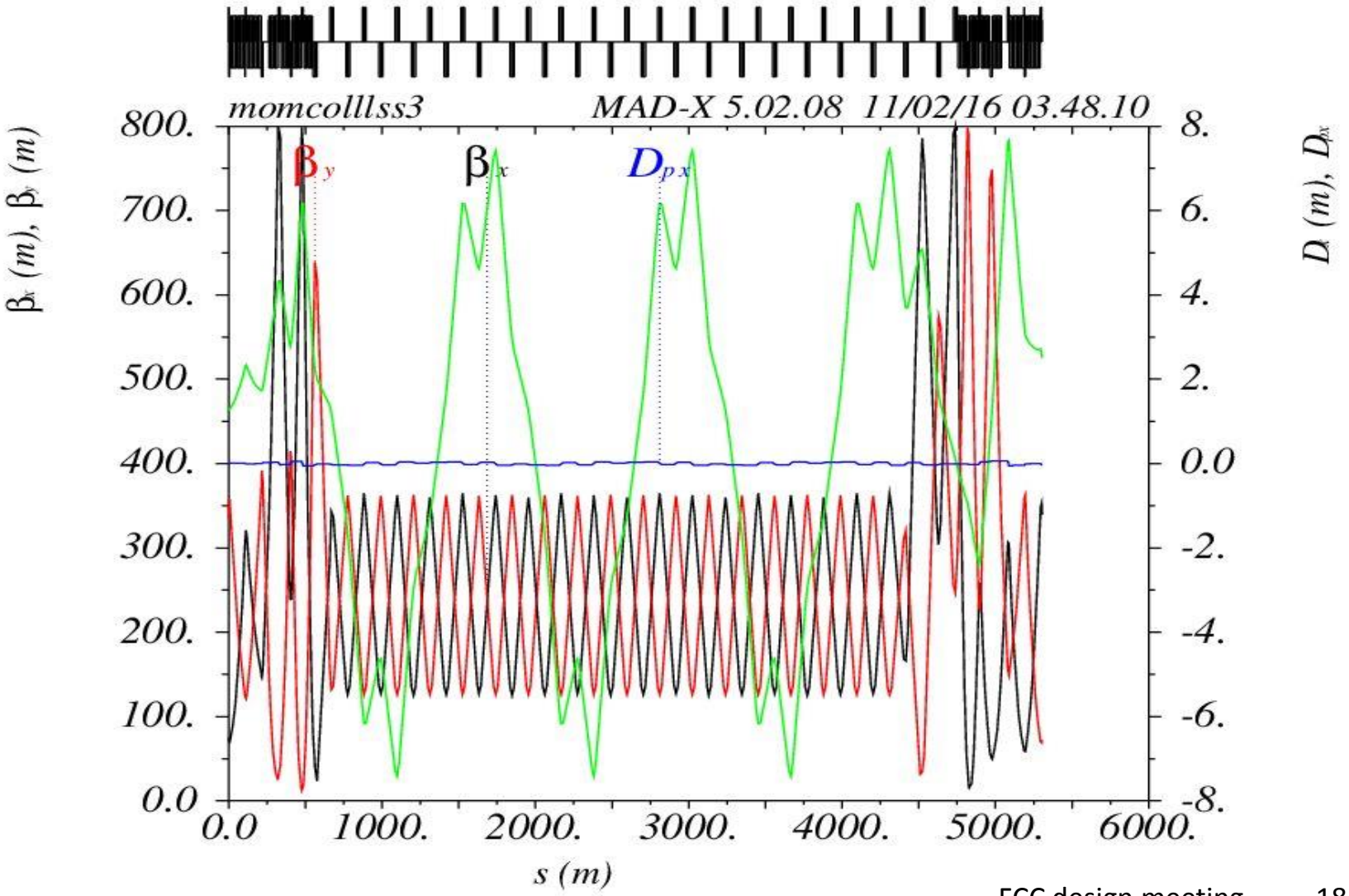
Fodo cells phase advance has been reduced from 90° to 60° withtout any other change.
Dispersion at location of primary collimator is 5.1m.



Momentum collimation optics

Fodo cells phase advance has been reduced from 90° to 60° with additional quads matching to improve dispersion.

Dispersion at location of primary collimator is 7.4m.



Next steps :

- LSS aperture calculation to determine quads physical size

- First study of integration of 2 beams with their layout. Addition of dog-leg if needed to

optimise beam separation, according to integration possibilities.

- Writing of a note before Rome's FCC week to summarize option 1.