Chromaticity calculation in the Booster using measurements of field components in the main magnets.

A. Drozhdin

September 9, 2003

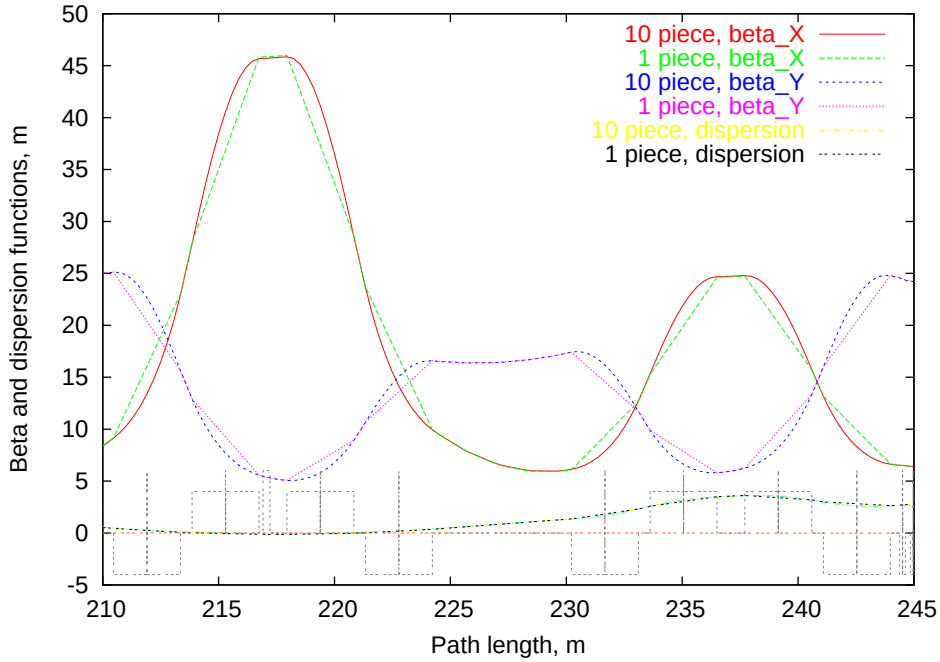

Figure 1: Lattice functions calculated using MAD with Booster magnets divided by 10 pieces.

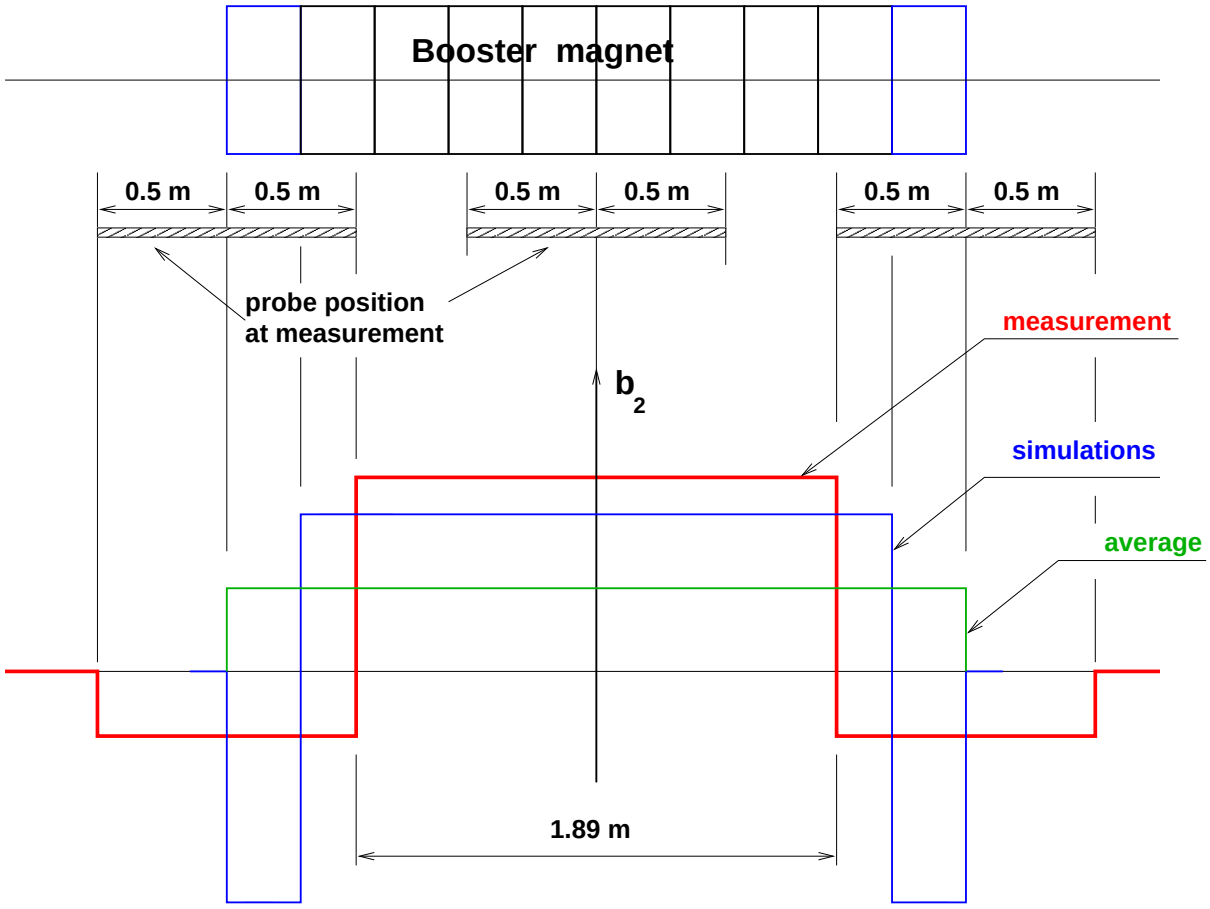

Figure 2: Measured sextupole component and component used in simulations for magnets divided by 10 pieces.

Table 1: Measured "body" and "end" sextupole components and calculated average value of sextupole component. "end" component gives an effect of sum of two magnet ends. Example of average value calculations for magnet F47 at 8 GeV: $b_2(average) = [-0.5 \cdot 3.6 \cdot 1m + 5.3 \cdot 1.89m - 0.5 \cdot 3.6 \cdot 1m]/2.89m = 2.22$

	measurement		calculated
magnet	"end"	"body"	average
	10^{-4}	10^{-4}	10^{-4}
F47 (0.4 GeV)	-6.0	3.0	-0.11
F47 (8 GeV)	-3.6	5.3	2.22
D10 (0.4 GeV)	-9.2	-5.45	-6.75
D10 (8 GeV)	-8.2	-4.8	-5.98

Table 2: Booster lattice functions calculated using MAD with magnets divided by 10 pieces and without magnet division.

	0.4 GeV			8 GeV		
Booster parameter	one-piece magnet	ten-piece magnet		one-piece magnet	ten-piece magnet	
	average sextupole component	average sextupole component	end + body sextupole component	average sextupole component	average sextupole component	end + body sextupole component
α	0.032229	0.032277	0.032277	0.033707	0.033740	0.033740
γ_t	5.570269	5.566145	5.566145	5.446764	5.444099	5.444099
ν_x	6.768735	6.762825	6.762825	6.700608	6.694742	6.694742
ν_y	6.810815	6.810537	6.810537	6.799682	6.799416	6.799416
ξ_x	-23.082052	-21.237170	-20.207224	-2.755544	-3.581173	-1.913128
ξ_y	10.953403	9.381248	9.480498	4.402950	4.071552	3.882586
max β_x	45.997981	45.856390	45.856390	33.805276	33.813744	33.813744
max β_y	25.614591	25.722259	25.722259	20.498978	20.490054	20.490054
max D_x	6.227886	6.155235	6.155235	3.212050	3.216011	3.216011