Chromaticity modeling at 8 GeV - beam measurement vs. field measurement (Ray vs. Joe).

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September 10, 2003

b_2 - measured sextupole component of Booster magnet.

$$b_2 = \frac{1}{2B_o}\frac{d^2B}{dx^2}\,(0.0254)^2 \tag{1}$$

k_2 - MAD code sextupole component.

$$k_2 = \frac{1}{B\rho}\frac{d^2B}{dx^2} = \frac{b_2 \cdot 2B_o}{B\rho \cdot (0.0254)^2} \tag{2}$$

At injection ($E_{kin} = 0.4\ GeV$):

$B_o(foc) = 0.077929\ T$

$B_o(defoc) = 0.06627\ T$

$B\rho = 3.1831\ T \cdot m$

At the top energy ($E_{kin} = 8\ GeV$):

$B_o(foc) = 0.7259\ T$

$B_o(defoc) = 0.6173\ T$

$B\rho = 29.6504\ T \cdot m$

Table 1: Measured "integral" sextupole components (J.DiMarco, Aug.03), and calculated and measured chromaticity (R.Tomlin, Jan.02(AC), Jan.03(DC) and Aug.03(AC)).

magnet	measured "integral" sextupole components		calculated chromaticity		measured chromaticity		
	b_2	k_2 (MAD)	ξ_x	ξ_y	ξ_x	ξ_y	date
injection ($E_{kin} = 0.4\ GeV$)							
F47	$-0.3 \cdot 10^{-4}$	-0.0023					
			-23.08	10.95	-23.3	10.8	Jan.03 (DC)
			-23.08	10.95	-19.0	11.0	Jan.02 (AC)
D10	$-6.6 \cdot 10^{-4}$	-0.0426					
top energy ($E_{kin} = 8\ GeV$)							
F47	$+2.2 \cdot 10^{-4}$	+0.0167					
			-2.76	+4.40	-5.36	+4.11	Aug.03 (AC)
D10	$-6.0 \cdot 10^{-4}$	-0.387					