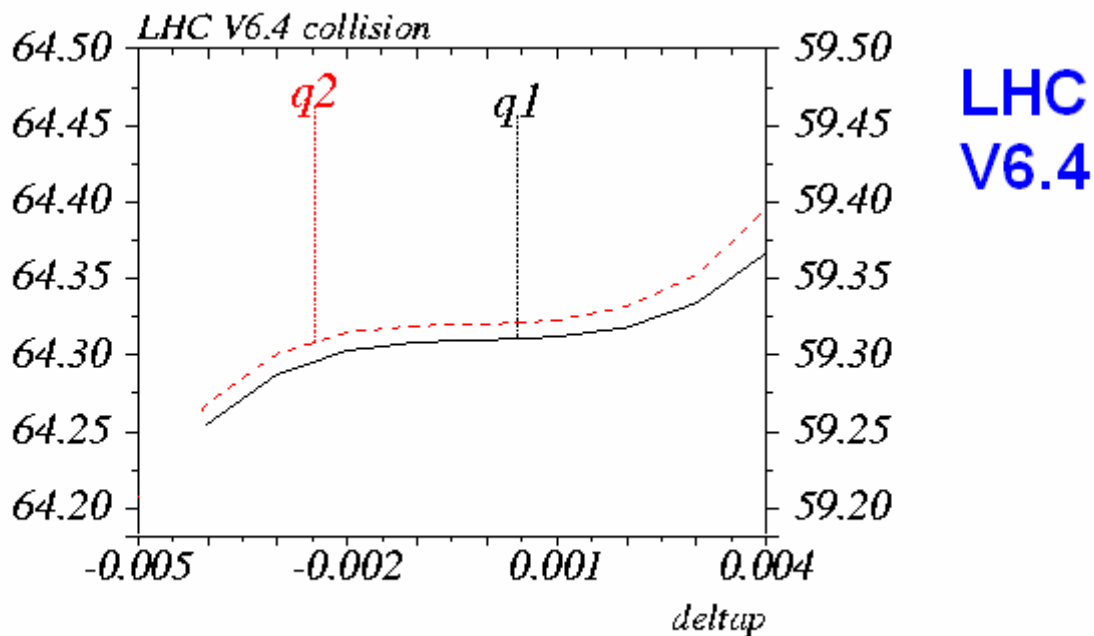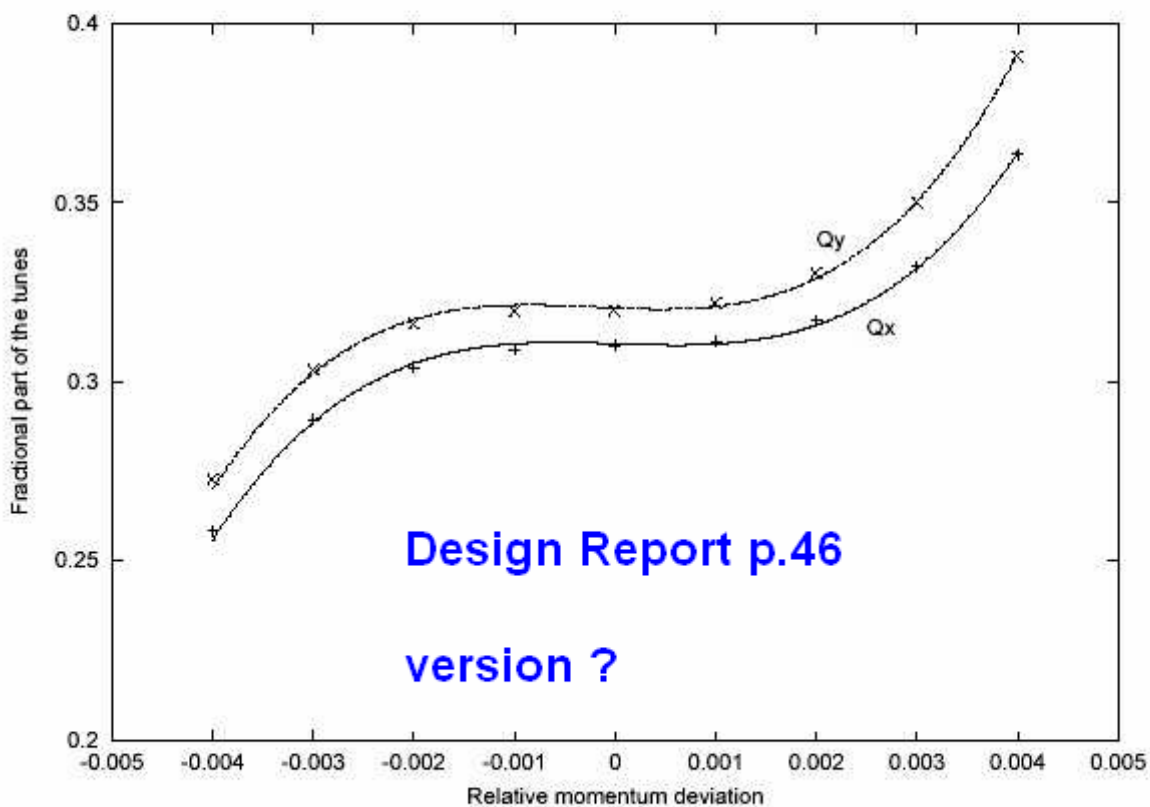# Tunes vs. deltap/p

in collision optics
(IP1 and IP5 squeezed)
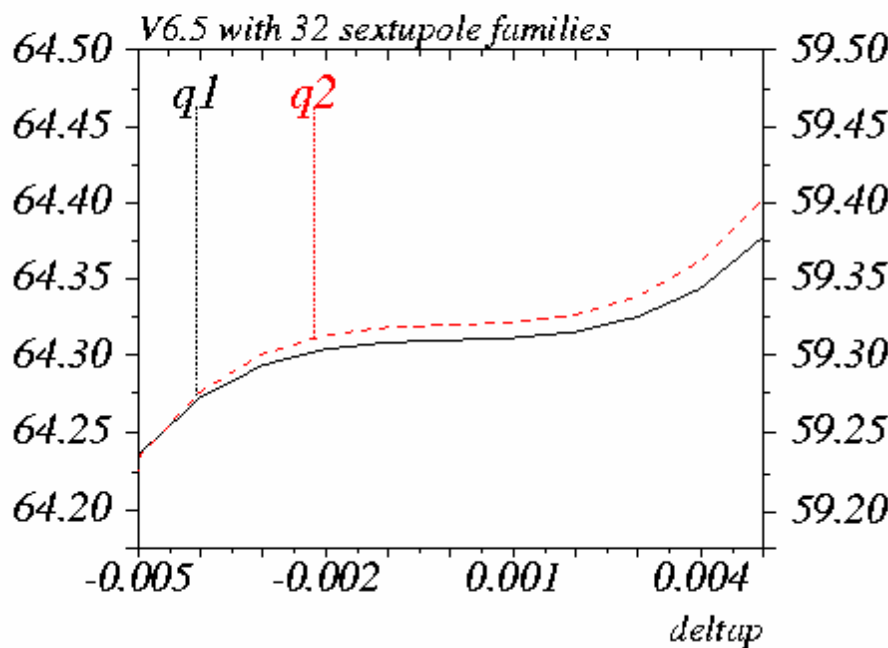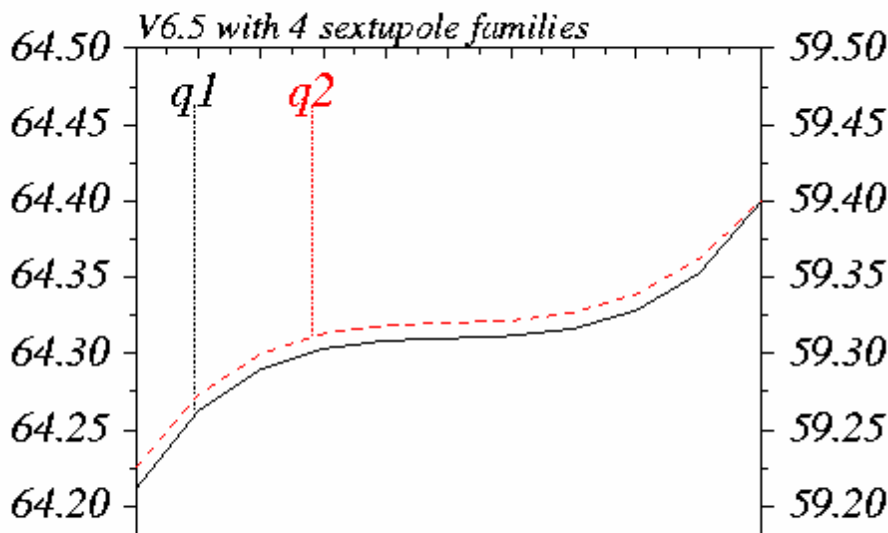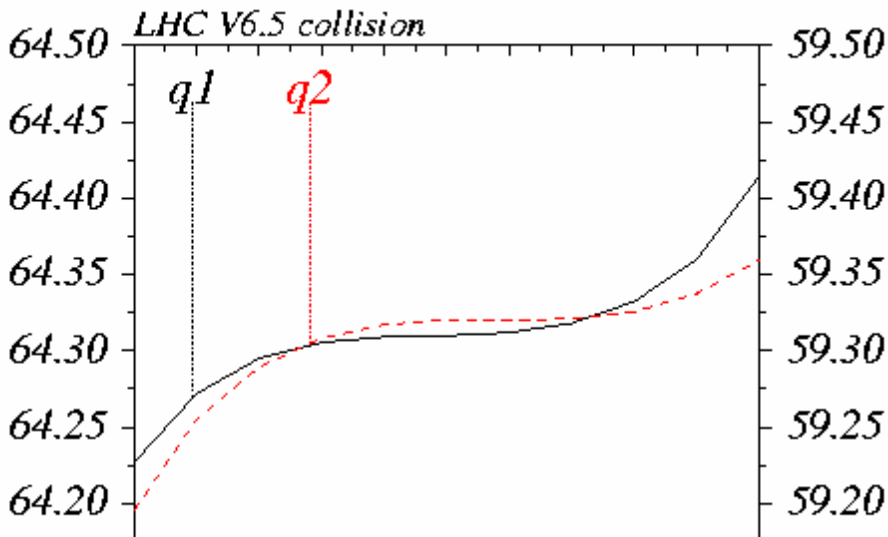

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version ?

LHC V6.4

**A.Verdier, "Phase between IP's and non-linear chromaticity",
LHC Project Note 103, August 1997 :**

**In "collision" optics at least one of the fractional phase
advances IP1-IP5 and IP5-IP1 must be around .25 or .75
(tolerance 0.01).**

	MUX	MUY	dmuX	dmuY
V6.4				
"IP1"	0.000000	0.000000	.06	.76
"IP5"	32.060602	29.761134		
"IP1.L1"	64.310000	59.320000	.25	.56
V6.5				
"IP1"	0.000000	0.000000	.05	.60
"IP5"	32.049602	29.604127		
"IP1.L1"	64.310000	59.320001	.26	.72
V6.501				
"IP1"	0.000000	0.000000	.98	.73
"IP5"	31.980940	29.734470		
"IP1.L1"	64.310000	59.320001	.33	.59

LHC V6.5 collision

LHC
V6.5

new phase
advances
in cleaning
insertions

V6.5 with 4 sextupole families

V6.5 with 32 sextupole families

deltap

LHC V6.501

(new phase advances proposed to improve mechanical aperture)
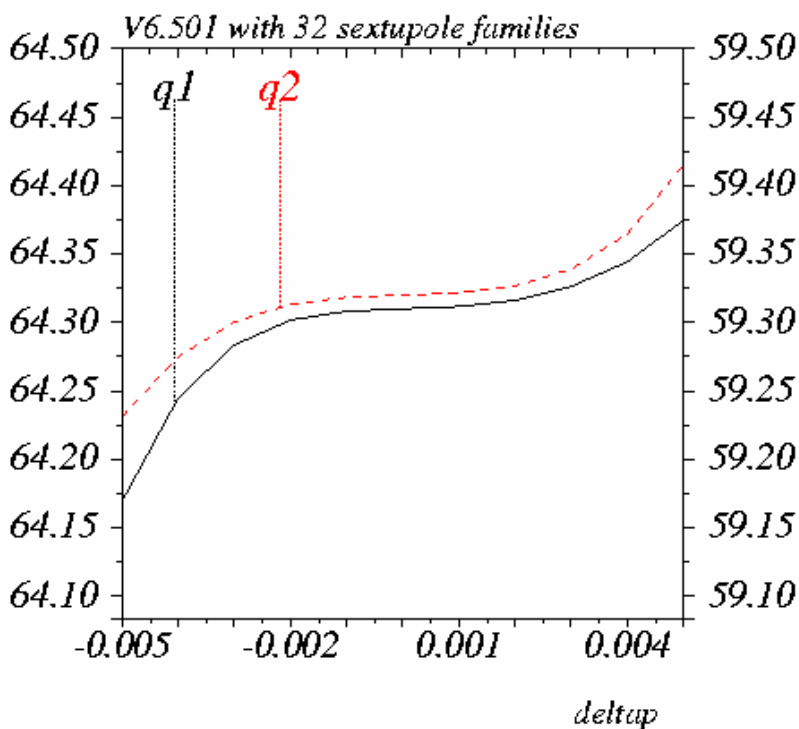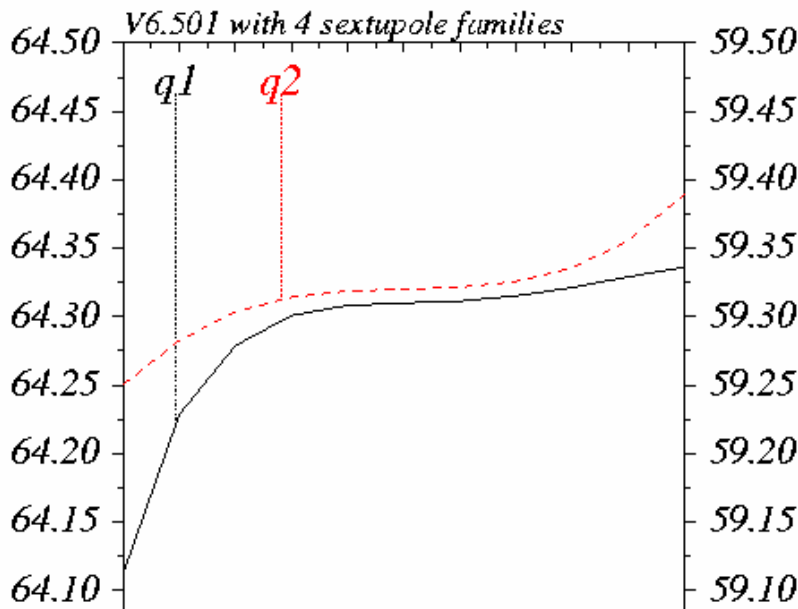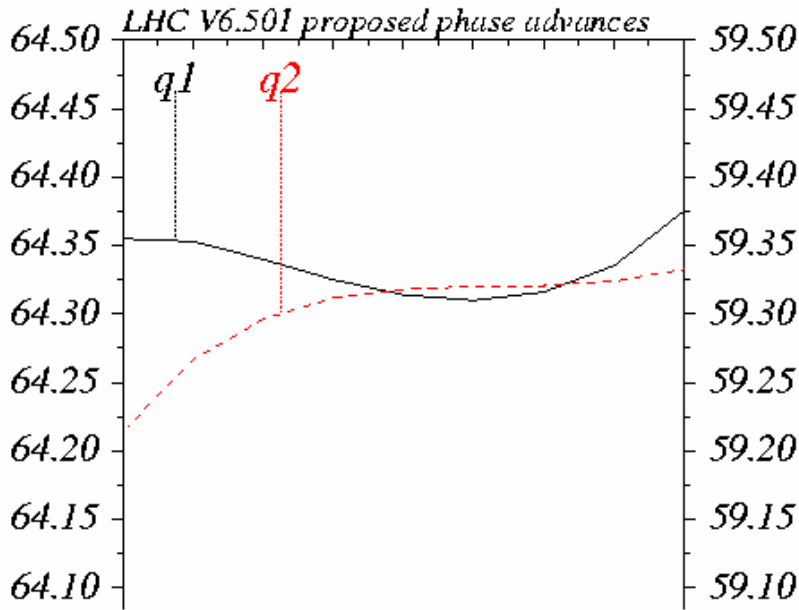
Conclusion:

Moving away from the phase advances of V6.4 relies on the operational feasability of chromaticity corrections using more than one sextupole family per plane