

# quality factor

- Initially assume that the phase advance is 90 degrees per cell. sum the contribution assuming that the cell have ++--++--.....
- pair the MQ as close as possible.
- Then check with the exact phase advance, beta function the effect on the betabeating.

# quality factor

$$\frac{\left| \sum_j \beta_j \cdot k_j \cdot l \cdot b_{2j} e^{2i\mu_j} \right|}{\beta_{\max} \cdot k \cdot l}$$

beta is the beta function at the slot j

K is the quad strength  
(positive for foc, negative for defoc)

L is the quadrupole length : 3.1 meters

B<sub>2j</sub> is the b<sub>2</sub> in units of the quad

M<sub>uj</sub> is the phase advance at slot j

4 factors : for x and y , ap1 ap2.

# comparison with random assignment

- r.m.s. of ap1 : 11.6
- r.m.s. of ap2 : 14.1
- r.m.s. of ap1+ap2 : 12.8

$$\frac{\Delta\beta}{\beta} = \sqrt{N/2} \frac{b2rms}{\sqrt{2}} = 45$$

N=24 number of FODO in sector 81

# quality factor

	ap1	ap2
x	26	41
y	26	35

vs 45 which represents 1 r.m.s. of a random distribution

position	CMid	b2-units-aç	b2-units-ap2
11R8			
12R8	74	12.89458	7.360621
13R8	96	0.644497	24.98981
14R8	75	20.79185	33.2454
15R8			
16R8	63	3.92846	11.36094
17R8	80	2.767468	-12.66571
18R8	72	-11.97865	18.39871
19R8			
20R8	71	0.248981	3.088937
21R8	58	1.014764	0.965175
22R8	51	-24.01516	-22.45645
23R8			
24R8	50	-15.2102	-26.07155
25R8	95	9.090457	8.893297
26R8	52	-8.939946	-13.78051
27R8			
28R8	53	-12.22288	-13.06144
29R8	92	9.93006	11.60927
30R8	90	5.336163	18.77358
31R8			
32R8	65	3.137654	-6.100486
33R8	173	1.375198	-4.181992
34R8	32	-10.58631	-20.96573
33L1	57	23.5765	5.681845
32L1	66	4.051815	-5.429937
31L1			
30L1	68	-4.789013	2.323273
29L1	34	-16.40962	-19.84113
28L1	35	-16.60716	-11.50008
27L1			
26L1	69	-10.42188	-11.58173
25L1	56	-12.57015	-11.62316
24L1	64	3.533655	-1.627655
23L1			
22L1	67	19.48867	2.249415
21L1	79	7.26192	14.39785
20L1	73	19.36312	4.645405
19L1			
18L1	62	7.089417	-2.467204
17L1	98	7.534767	12.77061
16L1	61	8.769591	3.92846
15L1			
14L1	55	1.212382	-13.82537
13L1	100	8.447959	6.175874
12L1	54	-0.467792	-15.65763
11L1			