Section 12 PEP-II LER Modifications

The modifications to the LER for PEP-N are minor. The quadrupole in the center of the IR12 straight section will be removed and relocated 15 m downstream to allow for installation of the detector dipole. A symmetrical quadrupole (new) will be added to make a low beta insertion. The resulting new lattice is shown in Figure 12-1 along with the IR12 beta functions. This layout makes beta functions at the collision point of 1 m vertically and 3 m horizontally. These lattice functions are acceptable. The magnet strengths for this lattice are shown in Table 12-1. The low beta point can be moved longitudinally to allow extra space for the detector if needed. A lattice with the same geometry but with a 1 m offset is shown in Figure 12-2 and the corresponding magnet strengths in Table 12-2. Again, the betas are acceptable. Both of these lattices leave the rest of the LER unchanged.

The magnet strengths are only slightly stronger for the new lattices. In the worst case, one magnet is 40% stronger which is still within the range of the magnet parameters. Several new power supplies are needed. The new additional quadrupole exists and is shown in Figure 12-3.

As the energy of the VLER is changed, the detector dipole strength is change in proportion. Thus, the VLER beam orbit will not change. However, the LER orbit does move. Four dipole magnets will be added to LER to keep the collision point fixed. These dipoles exist and are shown in Fig. 12-4.

The vacuum pressure in LER just upstream of the collision point must be very good to minimize lost particle backgrounds. Fortunately as is unique to PEP-N, massive pumping can be installed immediately upstream of the collision point. The detector is only on the downstream side of the collision point. Thus, a vacuum pressure well below the nanoTorr level should be possible.

The four dipole magnets as well as the detector dipole cause synchrotron radiation inside the vacuum system of LER. Masking of this power will be handled in a similar fashion to existing masks in PEP-II. PEP-II presently has masks which handle much more power.

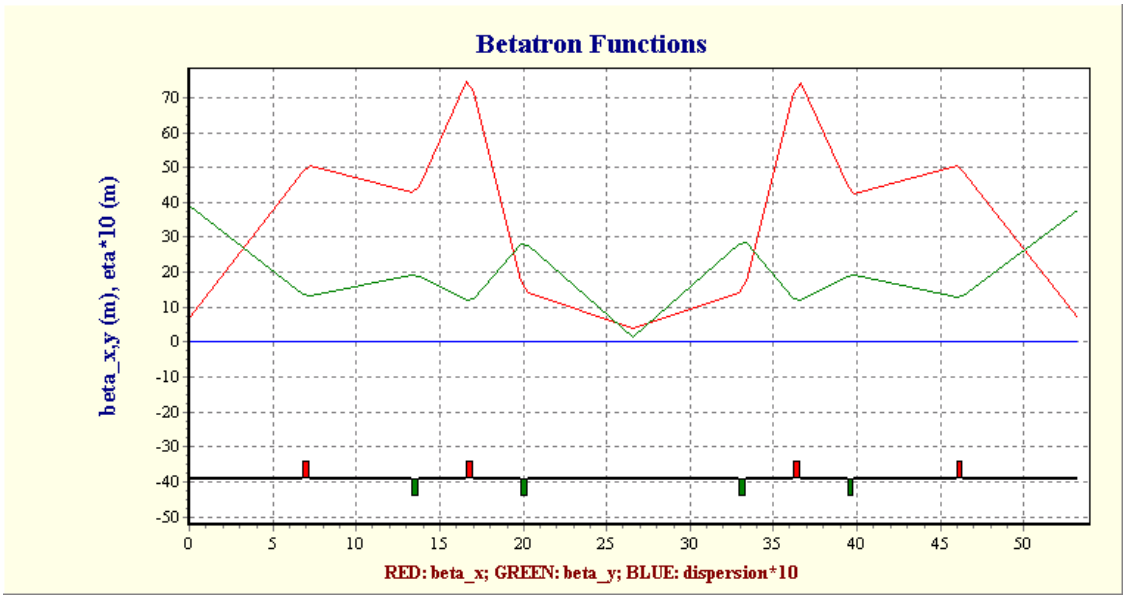

Fig. 12-1: IR12 beta functions for LER with the collision point at the center. One quadrupole has been moved and one quadrupole added to the present lattice.

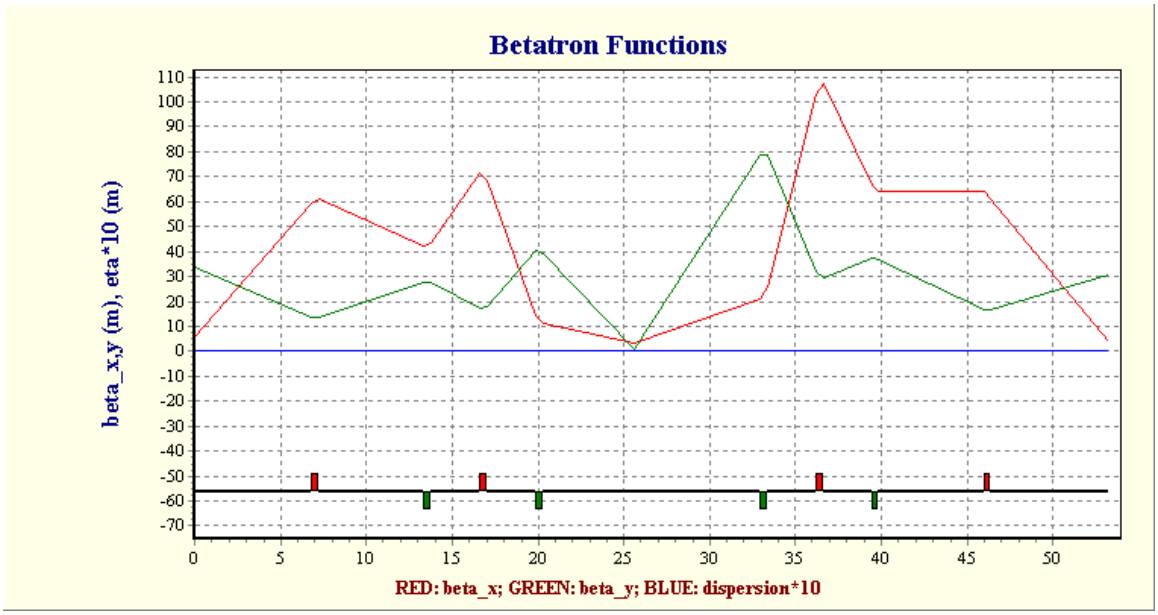

Fig. 12-2: IR12 beta functions for LER with the collision point one meter displaced longitudinally. One quadrupole has been moved and one quadrupole added to the present lattice.

Table 12-1: Magnet settings for the new LER lattice with a centered collision point.

Name	L (m)	k (m^{-2})	B' (T/m)	s (m)
D	6.8			6.8
QF	.435	0.25	2.669	7.235
D	6.1			13.335
QD	.435	-0.27	-2.882	13.77
D	2.83			16.6
QF	.435	0.59	6.298	17.035
D	2.83			19.865
QD	.435	-0.62	-6.618	20.3
D	6.3			26.6
D	6.3			32.9
QD	.435	-0.62	-6.618	33.335
D	2.83			36.135
QF	.435	0.59	6.298	36.6
D	2.83			39.43
QD	.435	-0.27	-2.882	39.865
D	6.1			45.965
QF	.435	0.25	2.669	46.4
D	6.8			53.2

Table 12-2: Magnet settings for the new LER lattice with a collision point displaced one meter.

Name	L (m)	k (m^{-2})	B' (T/m)	s (m)
D	6.8			6.8
QF	.435	0.30	3.202	7.235
D	6.1			13.335
QD	.435	-0.30	-3.202	13.77
D	2.83			16.6
QF	.435	0.61	6.511	17.035
D	2.83			19.865
QD	.435	-0.70	-7.472	20.3
D	5.3			25.6
D	7.3			32.9
QD	.435	-0.60	-6.404	33.335
D	2.83			36.135
QF	.435	0.57	6.084	36.6
D	2.83			39.43
QD	.435	-0.22	-2.348	39.865
D	6.1			45.965
QF	.435	0.26	2.775	46.4
D	6.8			53.2

Fig. 12-3: Existing LER quadrupole magnet to be added in IR12.

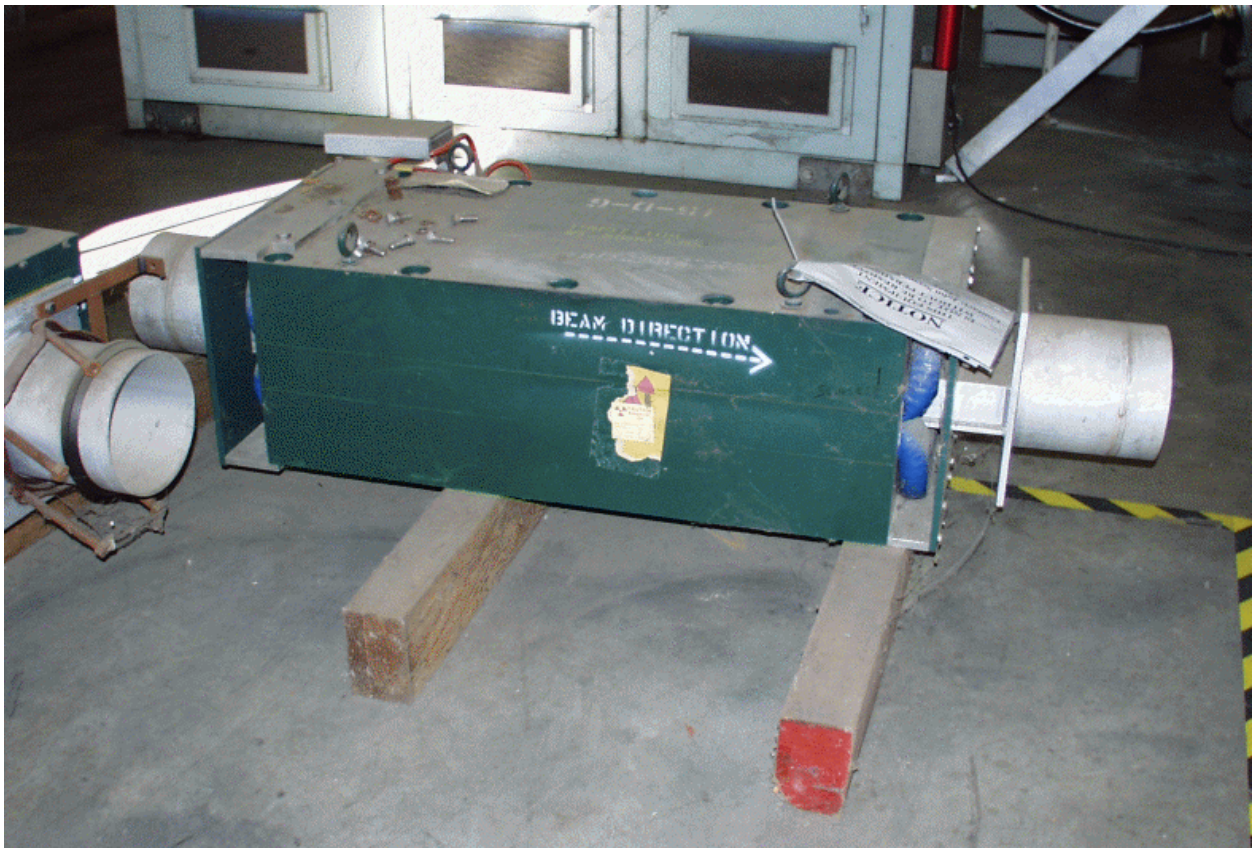

Fig. 12-4: Existing dipole magnets to be used for LER orbit correction during collision point alignment.