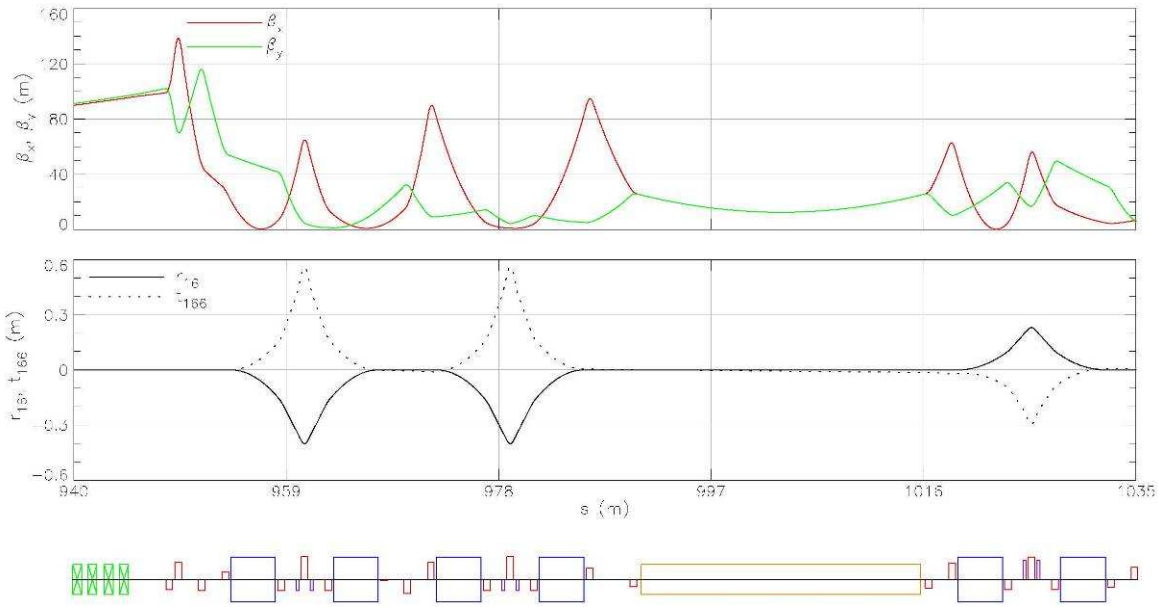

Figure A.1.8.1-3 The optics for Cell A in the SA section. Five quadrupole magnets focus the large beta functions exiting LB down to manageable values. Essentially, the first sixteen quadrupole strengths are varied to match $\alpha_x = \alpha_y = 0$ and $\beta_x = \beta_y = 12.5m$ in the center of the 25 m undulator, as well as $r_{16} = 0$ and $r_{26} = 0$ at the ends of the second and fourth bends, all the while attempting to keep the beta functions below 100 m and minimizing emittance growth. Then the last seven quadrupole strengths are varied to provide $r_{16} = 0$ and $r_{26} = 0$ at the end of the last bend and to match into the Twiss parameters for the undulator in the following Cell B. Sextupole magnets places in dispersive sections between bends serve to set $t_{166} = 0$ and $t_{266} = 0$ between the first and fourth bends, and between the fifth and sixth bends, making this section achromatic to second order.

The linear optics for Cell A are shown in Figure A.1.8.1-3. Since the beta functions exiting LB are large, five quadrupole magnets are used to focus them down to manageable values. The following four bends direct the beam into the 25 m undulator, with quadrupole magnets interspersed to give $\alpha_x = \alpha_y = 0$ and specified values for the beta functions in the center of this undulator. Additionally the the quadrupole magnets between the first two bends focus the dispersion and its slope to zero at the end of the second bend, and similarly for the third and fourth bends. After the undulator a two-bend achromat matches Twiss parameters into the undulator in the first Cell B. With the Twiss parameter and dispersion constraints satisfied, the quadrupole strengths are further optimized to reduce the radiative emittance growth as much as possible.

The second order dispersion, also in the figure, is manipulated by six sextupole magnets. Four sextupole magnets placed in areas of large dispersion are used to make $t_{166} = 0$ and $t_{266} = 0$ from the beginning of the first bend to the end of the fourth bend. Similarly, two sextupole