

Design of the HERA-e Lattice and Chromaticity Correction for the Luminosity Upgrade,

M. BERGLUND, E. GIANFELICE, T. SEN, DESY - The luminosity in HERA will be increased nearly five times by squeezing both the electrons and protons to smaller spot sizes at the interaction points (Ips). The electron spot sizes are reduced by a) additional focusing in the interaction regions (IRs) and b) increasing the horizontal phase advance per FODO cell in the arcs from 60 degrees to 90 degrees. The stronger focusing reduces the equilibrium horizontal emittance by nearly a factor of two and also increases the chromaticity. The linear and nonlinear chromaticities are corrected by a new arrangement of sextupoles. Non-interleaved sextupoles placed symmetrically about the IPs in the north and south insertions correct the nonlinear chromaticity generated in the IRs while the linear chromaticity of the ring is corrected by two families of sextupoles placed in the remaining FODO cells. Pairs of spin rotators have also been added in the north and south IRs to provide longitudinally polarized electrons for the H1 and ZEUS experiments. Additional constraints on the focusing strengths have been incorporated in the lattice to make it spin transparent and rotator strengths have been adjusted to ensure that the spin is longitudinal at the IPs even in the presence of the experimental solenoidal fields.