



CURVED-IMAGE

Simulation of aberrations and Coulomb interactions
in curved axis systems



CURVED-IMAGE is a stand alone package which is an extension of our IMAGE software. It is used to compute the combined effects of aberrations and discrete Coulomb interactions by direct ray tracing, in systems that can have a curved optical axis. The software will handle any combination of round lenses and multipole lenses, of both magnetic and electrostatic type, as well as Wien filters and prisms.

The software requires the SOFEM Field and 3D Field packages.

Complete bunches of particles are traced simultaneously. The initial conditions of the particles in each bunch are set using a Monte Carlo simulation with random number generators. The initial beam shape can be square, round, oblong or oval and the spatial distribution can be uniform or Gaussian. The angular distribution can be uniform, Gaussian or Lambertian and the initial energy spread distribution can be uniform, Gaussian or Maxwell-Boltzmann.

The program uses the ability to perform ray-tracing directly through the fields of the optical elements, to a self consistency of a few picometres. In addition, the program will compute the second-order and third-order aberrations in the curved axis system using the differential algebra method. The program is therefore of great generality.

In particular, the combined effects of aberrations and Coulomb interactions are taken into account automatically and in a unified way.