

REQUIREMENTS FOR A GOOD CSR CODE

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1. Source particles close to a planar reference orbit consisting of an arbitrary sequence of bends and straights. Option to include undulator orbits.
2. A quasi-realistic vacuum chamber following the reference orbit, for instance a rectangular perfectly conducting chamber of constant height (but possibly varying width).
3. An arbitrary phase space distribution in the CSR source (6D, 4D) and corresponding charge/current distribution (3D, 2D).
4. The possibility of self-consistency, allowing for evolution of the bunch under its self-force, conditioned by electromagnetic boundary conditions on the chamber walls.
5. The ability to handle very short bunches, down to micron size.
6. Full field calculation including longitudinal and transverse wake fields and space charge. Optionally, fields at any point in the vacuum chamber.
7. Fast turn-around on modest hardware (few CPU's, low-end GPU).

A scheme based in the frequency domain offers a remarkably simple path to meeting these requirements. See my note **Remarks on the Road Map for Computing Coherent Synchrotron Radiation**. Write to warnock@slac.stanford.edu.