

Initial Beam Set-Up for E166: Beam through Undulator

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Assume that beam through the 1" beam tube has previously been established and all beamline devices have been checked out and shown to work properly.

Beam through Undulator

1. 1" id drift tube in beamline
2. Soft bends on at 90% of full value (-617 G-m; Bmax = 686 G-m)
3. Steer beam to FFTB dump: 10 Hz, 1×10^{10} e-/bunch, 50 GeV
4. Autosteer and record Gold Orbit
5. Move drift tube with motorized actuators to zero drift tube BPMs
6. Insert OTR screen to make bremsstrahlung beam
7. Steer electron beam such that bremsstrahlung beam signal is maximized in SiW
8. If signal cannot be peaked, manually move 3 mm id target aperture if necessary to transmit bremsstrahlung, repeat 6
9. Remove OTR screen
10. Move drift tube with motorized actuators to zero drift tube BPMs
11. Record orbit, establish launch feedback
12. Tune small spot (40 mm, rms) using Wire Scanner
13. Reduce beam halo through linac and linac collimator tuning
14. Reduce beam current to nominal 3×10^9 e-/bunch; check to see that BPMs are still reading
15. Turn off beam; move undulator into beamline; restore beam at 1 Hz
16. Move undulator tube manually to minimize beam loss (minimize loss monitor signals). Iterate horizontal-front then back, vertical-front then back.
17. Restore 10 Hz beam rate and turn on feedbacks
18. Increase beam current in steps, repeating step 14 until full current is achieved
19. Repeat item 13: halo reduction

What to do if beam does not initially go through undulator:

1. Locate beam of front face of collimator by viewing profile monitor; note position of beam on collimator if visible
2. Beam should be going into collimator aperture; if not check beam orbit, restore 1" id tube and check that drift tube BPMs still read zero and beam quality is still good. If large beam offset, stop and determine if there is a mover mechanism fault
3. If beam is very close to aperture, remotely move undulator in parallel steps (front and back move together) until beam disappears into aperture.
4. Move back of undulator (X and Y) to minimize beam loss signal
5. Go to item 14 above.