

Stability requirements for RF Amplitude and Phase of Main Superconducting Cavities and Injection Timing in the Compact ERL

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In ERL-based light sources, higher stability performance is expected to be required for RF control and injection timing, because the beam has shorter bunch length (less than 100 fs at minimum) and smaller momentum(energy) spread compared with those of the existing storage-ring-based SR sources. We studied effects of RF amplitude and phase variation of main superconducting cavities and effects of timing jitter of beam injection on beams in the compact ERL, using a simulation code “elegant”. In this presentation, we show the simulation results and discuss stability requirements for the RF amplitude and phase and the injection timing.

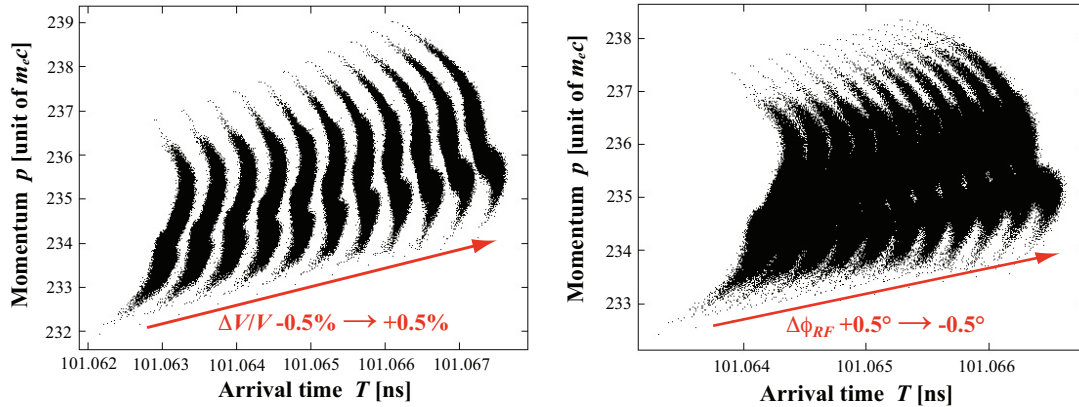


Figure 1: Variation of simulated bunch arrival time and distribution on the time-momentum plane in the bunch compression mode of the compact ERL for the RF amplitude error of -0.5 % to 0.5 % in 0.1 % step(left) and for the RF phase error of -0.5° to 0.5° in 0.1° step(right). Bunch arrival time and distribution clearly changes depending on the RF amplitude V and phase ϕ_{RF} .