High Repetition Rate Beam Physics at FACET

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Abstract

We propose to operate the FACET linac with multiple electron bunches per RF pulse. We will produce two electron bunches at the thermionic cathode, separated by integer multiples 5.6 ns, which is the period of the subharmonic buncher. Several accelerator subsystems will be significantly affected by the transition from one to two electron bunches per RF pulse. These include the injector, North Damping Ring (NDR), North Ring to Linac (NRTL), and the main linac. In addition, the primary beam diagnostics, including BPMs, will not be able to resolve the individual bunches at their closest separations. We discuss methods to extract information from the diagnostics in this case as well as the use of Lucretia for multibunch beamline simulations.

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