# Parallel Beam Dynamics Simulation Tools for Future Light Source Linac Modeling

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Large-scale modeling on parallel computers is playing an increasingly important role in the design of future light sources. Such modeling provides a means to accurately and efficiently explore issues such as limits to beam brightness, emittance preservation, the growth of instabilities, etc. Recently the IMPACT codes suite was enhanced to be applicable to future light source design. Early simulations with IMPACT-Z were performed using up to 100M simulation particles for the main linac of a future light source. Combined with the time domain code IMPACT-T, it is now possible to perform large-scale start-to-end linac simulations for future sources, including the injector, main linac, chicanes, and transfer lines. In this paper we provide an overview of the IMPACT code suite, its key capabilities, and recent enhancements pertinent to accelerator modeling for future linac-based light sources.

This work was supported by the Director, Office of Science, Office of Basic Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.