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## **Integrating community codes for accelerator design and optimization**

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Advances in fidelity and performance of accelerator modeling tools, in tandem with novel machine learning capabilities, has prompted community initiatives aiming to realize “virtual test stands” that can serve as true analogues to physical machines. Such efforts require integrated, end-to-end modeling capabilities with support for parametric optimization and benchmarking. We present the ongoing development of an integrated Sirepo application to support the holistic modeling of accelerators. Our approach leverages existing modeling workflows, such as the Light Source Unified Modeling Environment (LUME), as well as community I/O frameworks, such as openPMD, to provide a toolbox for constructing and modeling beamlines. Users can build and test simulations using different community modeling tools, as well as connect individual tools to produce end-to-end simulations. Additional workflows have been developed to support machine learning tools that facilitate optimization and the development of surrogate models. We discuss some specific beamline modeling demonstrations as well as ongoing efforts to support code-agnostic design and development.

### **Footnotes**

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