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High-gradient C-band accelerating structure simulations for XFEL facilities using high performance computing

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Linacs are an integral part of high-gradient accelerating structures for X-ray Free Electron Laser (XFEL) facilities. For high energy (42+ keV) x-rays, this translates into a longer linac (linear accelerator), which in turn translates into increased cost due to the larger footprint. One such case is the DMMSC (Dynamic Mesoscale Material Science Capability) at Los Alamos National Laboratory. C-band devices are an attractive option, as they offer suitable electron beam properties and are significantly smaller than conventional L- or S- band structures. This need for state-of-art designs dictates increasingly complex structures such that CPU-intensive simulations are now a key part of accelerator component design. As that happens, high performance computing (HPC) becomes a necessary component of the design process. The Argonne Leadership Computing Facility offers a route to rapid design evaluation through successive simulations while varying, for example, geometric features and particle beam properties.

Footnotes

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North America

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