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## Numerical simulations of an integrated X-band high-field photoinjector

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Particle accelerators based on a two-beam acceleration scheme offer a path to high-accelerating fields by powering the accelerating structures using short (nanosecond) radiofrequency pulses. At the Argonne Wakefield Accelerator (AWA) facility, this approach was recently applied to an X-band radiofrequency gun and demonstrated an unprecedented electric field on the photocathode of  $\sim 400$  MV/m. In the next phase, a short X-band linac will be added to boost the beam energy up to  $\sim 10$  MeV. This paper examines the linac optimization and beam dynamics in this integrated system over a wide range of operating parameters. Planned experiments will also be discussed along with possible applications of the setup to compact light sources (e.g. inverse Compton scattering) or electron scattering experiments (e.g. microscopy or diffraction).

### Footnotes

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### Paper preparation format

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### Region represented

North America

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