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# Creating microbunched electrons for a coherent soft x-ray ICS source

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Imposing a density modulation, or microbunching, on an electron beam may improve the brightness of an inverse Compton scattering (ICS) source by orders of magnitude via superradiant emission. We analytically and numerically analyze a new method, termed ponderomotive bunching, to create microbunching on a relativistic electron beam. Here, an electron beam interacts with a copropagating beat wave formed by two laser pulses. Via the ponderomotive force, the beat wave imposes an energy modulation onto the electron beam, which is transformed into a density modulation.

We show that pondermotive bunching can create microbunching for relativistic electron beams. Additionally, effects of the electron beam emittance, energy spread, and laser pulse shape, on the quality of the microbunching is studied. Using these analytical results, verified by particle tracking simulations, we propose a coherent ICS source based on ponderomotive bunching.

## Footnotes

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