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Experimental efforts towards non-collinear superradiant Compton scattering

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Inverse Compton scattering by relativistic electrons off intense laser pulses provides an attractive option for compact radiation sources in the (soft) X-ray spectral range. Tunability of the radiation wavelength is greatly increased by varying the crossing angle in the interaction. On the other hand, the radiated power from these sources is typically rather low, limiting the range of applications. By imposing a spatial modulation on the electron beam the yield can be enhanced by many orders of magnitude via superradiant emission even when considering limiting contributions by spot sizes, energy spread and beam emittance. However, attaining the required density modulation at the relevant electron beam energy is still a major challenge. We will discuss our experimental efforts on two alternative methods of achieving the required density modulation for superradiant Compton scattering at the UCLA Pegasus laboratory: ponderomotive bunching by two lasers at different frequencies and attosecond velocity bunching using an s-band buncher linac in conjunction with a x-band linearizer. Our plans to observe the coherent enhancement of Compton scattering in the near future are considered.

Footnotes

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