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Superradiance in X-ray free-electron lasers

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The soliton-like superradiant regime in a free-electron laser is a fully non-linear phenomenon in which the bandwidth of a short pulse can be coherently broadened as the pulse is amplified. As such, superradiance has long been considered a promising route towards high-power ultrashort pulses exceeding the natural bandwidth of high-gain FELs. This regime has now been observed in several experiments from the infrared to the X-ray energy range. These experiments have confirmed intriguing effects such as the generation of self-similar pulses and coherent bandwidth broadening beyond the linear amplification bandwidth. I will review the existing experimental evidence for soliton-like superradiant behavior and compare these results with theoretical predictions.

Footnotes

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North America

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