

Abstract Submitted  
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**Generalised superradiance: producing temporally coherent broadband radiation**<sup>1</sup> JORGE VIEIRA, MIGUEL PARDAL, JOS MENDONA, RICARDO FONSECA, GoLP/IPFN, Instituto Superior Técnico, Universidade de Lisboa, AVRAHAM GOVER, Tel Aviv University — Superradiance is at the core of today’s most advanced light sources. Superradiant emission is highly desirable because it is characterised by the emission of temporally coherent radiation, where the intensity grows with the number of light emitting particles squared. Known superradiant emission mechanisms require temporal bunching of a particle beam at the emitted radiation frequency. We have recently showed that this bunching criteria can be strongly relaxed when looking at emission off-axis, where radiation is broadband and leads to ultra-short radiation bursts. We have thus found that coherent emission can be achieved by introducing a transverse modulation of the bunch at the frequency of the first emission harmonic. For off-axis emission, and if many harmonics are emitted, this means that modulating the particle bunch at an optical wavelength (e.g. 1 micron) could produce coherent radiation in the x-ray domain for example. Here, we explore this generalised superradiant emission process in the context spontaneous undulator radiation theory and discuss mechanisms to observe generalised superradiance in experiments.

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Jorge Vieira  
GoLP/IPFN, Instituto Superior Técnico, Universidade de Lisboa

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