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Compact Radiation Sources Using Dielectric Laser Accelerators

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Recent research into laser-driven dielectric structure accelerators has given rise to the potential to exploit novel coherent radiative processes with attosecond pulse lengths by exciting dielectric structures with optical-scale periodic features. The development of a solid state silicon-based near infrared (NIR) radiation source is a holy grail in the telecommunications industry. On-chip nanostructured electron sources could be readily coupled to similarly nano- to micron- scale silicon devices designed as optimized radiators. The demonstrated sub-cycle microbunching in DLA sources enables superradiant emission of NIR radiation, which, when coupled to photonic waveguides, would provide an on-chip, solid state solution for NIR power delivery to photonic circuit networks. We will discuss recent developments and near-term experimental plans for demonstrating DLA based radiation sources as part of the ongoing Accelerator on a Chip International Program (ACHIP).

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