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M2Po3A-01: Ultrafast Optically Pulse Triggered Microwave/Terahertz Emission from an Array of Inductively Charged Superconducting Rings

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It is well established that superconducting materials will emit microwave/terahertz radiation when illuminated with a femtosecond infrared laser pulse. Typically, this phenomena is examined by illuminating a constant current biased superconducting thin film bridge. In this investigation an inductively charged superconducting thin film ring is considered. We believe this configuration lends itself to a simple compact microwave/terahertz emitter device as the ring simultaneously plays the part of an antenna, waveguide, and power supply. The rings display a frequency dependence on the ring circumference, a well-defined polarization direction, and a radiation pattern like that of an electrically large loop antenna. With this knowledge we construct an array of superconducting ring emitters and demonstrate that a narrow microwave/THz beam is formed indicating coherent radiation. Results illustrate the rich non-equilibrium superconducting dynamics that span the optical, THz, and microwave regimes, and suggest the possibility of a unique pulsed coherent microwave/terahertz source.

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