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M4Or1B-02 [Invited]: Microwave Antenna Properties of an Optically Triggered Superconducting Ring

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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 voltage biased superconducting thin film bridge. In this investigation an inductively charged superconducting thin film ring is considered. We believe the configuration lends itself to a simple compact microwave emitter device as the antenna plays the part of the waveguide and power supply, and contact heating between the current leads and the superconductor are now eliminated. We find that the emitted energy of this system displays a power-law dependence with increasing current, laser energy, and illumination area. The rings also display a frequency dependence on the system dimension, a well-defined polarization direction, and a radiation pattern similar to that of an electrically large loop antenna. Results illustrate the rich and complex dynamics that span the optical, terahertz and microwave regimes.

Authors: Dr BULLARD, Thomas (UES Inc.); BULMER, John (University of Cambridge); MURPHY, John (University of dayton Research Institute); FERDINANDUS, Manuel (3Air Force Institute of Technology, IN/ENP, Wright Patterson AFB, Ohio); REED, Jennifer (UES Inc. - AFRL/RXAP); HAUGAN, Timothy (U.S. Air Force Research Laboratory)

Presenter: Dr BULLARD, Thomas (UES Inc.)

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