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Development of a Spatially-Resolved Microwave Interferometer PAUL SPECHT, MARCIA COOPER, Sandia Natl Labs — The development of a spatially-resolved microwave interferometer (SRMI) for non-invasively measuring the internal transit of a shock, detonation, or reaction front in energetic media is presented. Utilizing the transparency of many energetic materials in the RF regime, current microwave interferometers provide continuum-level tracking of the dielectric discontinuity that occurs across a shock or reaction front. While this continuum-level response can provide bulk shock and detonation velocities, it is insufficient to understand the complex wave and material interactions present in heterogeneous energetic materials. Leveraging interferometry and terahertz spectroscopy techniques, a heterodyne, spatially-resolved microwave interferometer was designed. A theoretical description of its operation and potential impact to current energetic materials research is discussed. Preliminary experimental results, including electro-optic sensing of a Doppler shifted microwave beam, are presented. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2015-0308A.

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