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Metamaterial Mediated Energy Exchange between Wave and Beam in the High-Power regime REBECCA SEVIOUR, YAP SOON TAN, Lancaster University, UK — In this presentation we discuss metamaterial mediated energy exchange between charged particle beams and electromagnetic waves in the high-power regime, using coupled mode theory and a Pierce's approach. We present a modified form of Pierce's theory which takes into account the presence of the metamaterial and the intrinsic loss associated with metamaterials. We examine the unit-cell surface current distribution and loss in a metamaterial consisting of Complementary Split Ring Resonators (CSRR), focusing on the differences in loss between metamaterials in waveguide and free-space. We also discuss experimental and numerical parameter extraction techniques and the validated of each approach in the different cases of metamaterials in waveguide and in free space.

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