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Enhanced Narrow-band, Coherent Emission from a Current Source Immersed in Cut-off of a Plasma-like Medium MIN SUP HUR, UNIST, BERNHARD ERSFELD, ADAM NOBLE, Scottish Universities Physics Alliance and University of Strathclyde, HYYONG SUK, GIST, DINO JAROSZYNSKI, Scottish Universities Physics Alliance and University of Strathclyde — In plasma-like media sharing a similar dispersion relation, there exists a cut-off frequency to make the wave number zero. This particular situation has been understood classically in a way that the radiation impedance becomes infinite, resulting in a total reflection of an incident wave. However, in this framework of understanding the cut-off, a pure current source immersed in the cut-off region leads to infinite radiation power from Ohm's law. This is obviously unphysical and requires a different approach to address the problem. In this presentation, we show that by solving the driven time-dependent Schrödinger equation, the radiation at the cut-off frequency can be selectively enhanced by several times the pure vacuum-emission. Important question here is whether such current sources are available in practical systems. We find that quasi-current sources are actually ubiquitous as long as the conversion efficiency from the current driver to the radiation emission is low. We demonstrate two such cases by PIC simulations; THz radiation from a plasma driven by colliding laser pulses, and THz from two-color lasers enclosed by a tapered waveguide. We also discuss the previous experimental results in terms of this enhanced emission concept.

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