



Metamaterials for optical Bragg accelerators

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We present a systematic study of the advantages of using optical artificial materials in designing periodic structures for laser-driven accelerators. As a case study, we investigate the electromagnetic properties of a Bragg waveguide, with its alternating layers being composed of artificial materials. The layers can be optimized to maximize the structure's properties. We show that when the structure's eigenmode interacts with free electrons, the maximum efficiency is nearly four times higher than in configurations that rely on natural materials. As a result, accelerators and radiation sources may be miniaturized significantly. *Published by AIP Publishing.* <https://doi.org/10.1063/1.5018251>