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Scalable THz generation in two-color laser-produced plasma KI-YONG KIM, YONG SING YOU, TAEK IL OH, University of Maryland — We report ultrafast, high-power terahertz (THz) generation in two-color laser-produced plasmas. For scalable THz generation, we have studied two schemes—long (one-dimensional) and fat (two-dimensional) plasma filamentation. In the case of long filament formation, we observe phase-matched THz generation, which occurs naturally due to off-axis constructive interference between locally produced THz waves. This emits conical THz radiation in the off-axis direction, peaked at 4∼7 degrees depending on the radiation frequencies. In this case, the total THz yield increases almost linearly with the filament length. Because of this, one can effectively increase THz output energy by simply extending the filament length. This overcomes the saturation effect previously reported, mainly caused by overdense plasma creation and laser intensity clamping in filamentation. In addition, we observe THz polarization rotation and control along long plasma filaments. In the second scheme, a cylindrical lens is used to produce two-dimensional plasma sheets. This also provides a simple method for scalable THz generation with enhanced plasma volume and coherent THz field addition.

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