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Electromagnetic response of a limited-size two dimensional plasma grating formed by cw laser pumping. FABIO RIGHETTI, MARK A. CAPPELLI, Stanford University — Incorporating a plasma into metamaterial and photonic crystal devices is advantageous, in particular because of its tunability. A variation in the plasma density results in a modification of the dielectric constant of the gaseous component enabling the tunability of its electromagnetic response. In our previous work we show tunable bandgaps and resonantly enhanced extinction in a device constructed from an array of discharge lamps that include a quartz envelope [1]. To overcome the limitations of a periodic device composed by both plasmas and dielectrics, we propose the use of a cw laser to generate unconfined plasma filaments in cesium vapor with peak plasma densities in excess of 10^{14}cm^{-3}. The lattice periodicity is obtain by focusing the laser through a microlens array. We describe the transmission of normal incidence electromagnetic waves at low terahertz frequencies, from 50 GHz to 0.6 THz. Spectroscopic measurements provide detailed information on the plasma density profile. Numerical simulations are carried out to investigate the behavior of the system and compare these to experimental results. [1] F. Righetti, B. Wang and M. A. Cappelli, Physics of Plasmas 25, 124502 (2018).

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