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## W-band 2D Periodic Lattice Oscillator

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Two dimensional (2D) periodic surface lattices PSLs [1-6] have applications in both fast-wave sources [1] and slow-wave sources [4]. Analytical theory and numerical PIC simulations have been used to design an electron beam driven W-band millimeter-wave oscillator, in which a cylindrical two dimensional (2D) periodic surface lattice (PSL) forms an over-sized mode-selective cavity. The 2D PSL consists of shallow periodic cosinusoidal perturbations in both the azimuthal and axial directions on the inner wall of a cylindrical waveguide. Electrochemical deposition of copper on a cylindrical aluminum former was used to construct the 2D PSL. The ratio of the diameter of the cylindrical structure to the operating wavelength is ~5. The performance of this slow-wave oscillator is being measured and will be compared with the numerical simulations.

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