

Abstract Submitted  
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**An Experimental Near-Field Focusing Plate**<sup>1</sup> A. GRBIC, L. JIANG, R. MERLIN, U. Michigan — Using a patterned grating-like surface, which we refer to as a near-field plate [1], we experimentally demonstrate focusing of 1.027 GHz radiation well beyond the diffraction limit. A near-field plate is a finely structured surface that acts as a modulated surface reactance [2]. Its ability to provide sub-wavelength resolution relies on the strong near-field coupling that exists between the reactive surface elements of the plate. This coupling sets up a highly oscillatory electromagnetic field at the plate surface which can focus in the near-field. The plate consists of an array of interdigitated capacitors printed on an electrically thin dielectric substrate. It focuses microwaves emanating from an S-polarized cylindrical source (vertical line current) to a focus with a null-to-null beamwidth equal to one-tenth of the wavelength. Passive surfaces that can focus electromagnetic energy to extreme subwavelength dimensions offer an advantage with respect to slabs in that they obviate the need for the 3D fabrication techniques. Applications in antennas, beam-shaping devices, wireless non-radiative power transfer systems, microscopy and lithography will be discussed. [1] R. Merlin, *Science* **317**, 927 (2007). [2] A. Grbic and R. Merlin, arXiv:0708.0049.

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