Nano-hole Array as a Lens

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We demonstrate that an array of nano-holes can act as a far-field lens: it converts radiation of an optical point source into a plane wave. If the point source moves, the plane wave continuously changes its direction.

The phenomenon was demonstrated theoretically and observed experimentally using a quasi-crystal array of nano-holes and a tapered fibre with a sub-wavelength aperture. Such an array, when illuminated with a plane wave, creates optical hot spots at distances of a few wavelengths from the array [1-2]. These hot spots are foci of the nano-hole lens demonstrated here.

Practicality of imaging complex objects and means of achieving sub-wavelength resolution with the nano-hole array are discussed.

[1] F. M. Huang, Y. Chen, F. J. Garcia de Abajo, and N. Zheludev, Appl. Phys. Lett. **90**, 091119 (2007).

[2] F. M. Huang, Y. Chen, F. J. Garcia de Abajo, and N. Zheludev, J. Opt. A: Pure Appl. Opt. 9, S285-S288 (2007).