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Wavefront Shaping: Controlling Light in Complex Media

The propagation of light in inhomogeneous media, such as biological tissues and the turbulent atmosphere, results in wavefront distortion and scattering, which imposes a major limitation in many applications. Examples range from microscopy and nanosurgery to astronomy. In addition to the frequently encountered spatial distortions, multiple-scattering also randomly distorts the polarization state of the incident light, and its temporal and spectral characteristics. However, although multiple-scattering is a random process, it is a deterministic one and it can be undone. I shall review the growing field of wavefront shaping and describe how, using a single spatial light modulator, one can control and correct the spatial, temporal, spectral and polarization distortions in random media. I shall demonstrate schemes for nonlinear imaging behind scattering layers, and for seeing 'around corners'.