

## **Nonlinear transfer of coherence among random waves**

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During nonlinear propagation of a statistical beam, energy and momentum transfer between waves can change the ensemble properties of the beam. Here, we consider the redistribution of modes for a system with fast wave fluctuations and slow medium response. We explore density- and gradient-driven instabilities, discussing both their basic physics and their effect on noisy information channels. Specific examples are given in photonics, where we establish a direct mapping between nonlinear optics and plasma physics and experimentally exploit the instabilities for new methods of dynamic imaging.