Projection, focusing and imaging behind a scattering screen

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The problem of understanding light propagation behind scattering media has led to an ongoing effort to achieve better control of predefined light patterns under more and more restrictive conditions in terms of the available feedback. Here we focus primarily on the problem of generating a single focus in a fluorescent sample placed behind a thin scattering screen without access to the region masked by the screen. Whereas upon the use of nonlinear excitation the total fluorescence signal has proven to be a good metric for such an optimization task, it fails in the linear regime. We show that by exploiting even a tiny angular "memory effect" region, variance maximization of the fluorescence signal readily enables focusing. The conditions for achieving a single focus and potential for imaging will be discussed. Other, related problems such as pattern projection behind a scattering screen will also be discussed.