Imaging through scattering media by using all optical feedback

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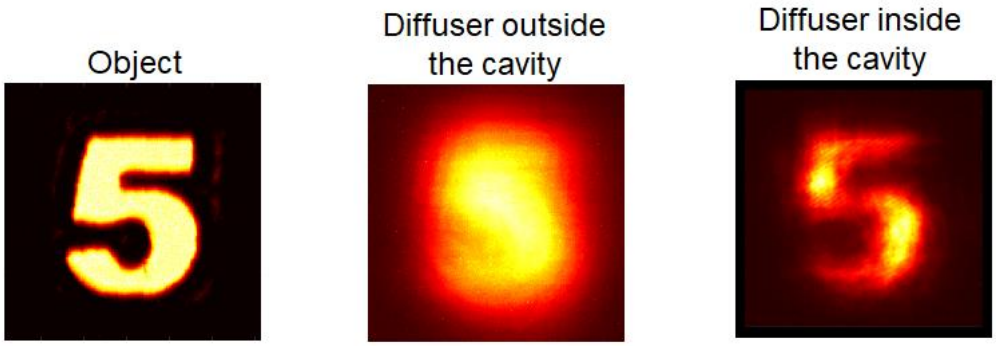
We demonstrate imaging through scattering media using all optical feedback in a degenerate cavity laser. An optical diffuser located in the far field plane of a 4f telescope significantly degrades the quality of the image (center image) compare to the original object (left image). However, locating the 4f telescope within a laser cavity results in a nearly undistorted image (right image). We show that competition between the many cavity modes over the nonlinear gain [1,2] selects a phase distribution in the object plane that minimize the round trip cavity loss by minimizing distortion caused by the diffuser [3].



[1] M. Nixon et. al., Nature Photonics 7, 919 (2013).
[2] V. Pal et. al., PRL 119, 1013902 (2017).
[3] R. Chriki, S. Mahler, et. al., unpublished.