Abstract Submitted
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A high-power fiber-coupled semiconductor light source with low spatio-temporal coherence[1] ROBERT SCHITTKO, ANTON MAZURENKO, M. ERIC TAI, ALEXANDER LUKIN, MATTHEW RISPOLI, TIM MENKE, ADAM M. KAUFMAN, MARKUS GREINER, Harvard University — Interference-induced distortions pose a significant challenge to a variety of experimental techniques, ranging from full-field imaging applications in biological research to the creation of optical potentials in quantum gas microscopy. Here, we present a design of a high-power, fiber-coupled semiconductor light source with low spatio-temporal coherence that bears the potential to reduce the impact of such distortions. The device is based on an array of non-lasing semiconductor emitters mounted on a single chip whose optical output is coupled into a multi-mode fiber. By populating a large number of fiber modes, the low spatial coherence of the input light is further reduced due to the differing optical path lengths amongst the modes and the short coherence length of the light. In addition to theoretical calculations showcasing the feasibility of this approach, we present experimental measurements verifying the low degree of spatial coherence achievable with such a source, including a detailed analysis of the speckle contrast at the fiber end.

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Robert Schittko
Harvard University

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