

Experimental optical encryption system based on a single-lens imaging architecture combined with a phase retrieval algorithm

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We propose, and experimentally demonstrate, a single-lens imaging system as a compact encoding architecture by using a hybrid protocol for data processing. The encryption process consists of coherent light illuminating a random phase mask attached to an input image (the data), then the outgoing complex field propagates until reaching a second random phase mask next to a lens: encrypted data is obtained at some output plane after the lens. We demonstrate the feasibility of this proposal, and highlight the advantages of using tridimensional speckle as a secure random carrier instead of a standard ciphertext recording?holographic-based encryption techniques. Moreover, we expose the compact system benefits compared to conventional encrypting architectures in terms of energy loss and tolerance against classical attacks applicable to any linear cryptosystem. Experimental results validate our approach.