Quantum Interference and Entanglement Induced by Multiple Scattering of Light - DTU Orbit (23/10/2017)

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We report on the effects of quantum interference induced by the transmission of an arbitrary number of optical quantum states through a multiple-scattering medium. We identify the role of quantum interference on the photon correlations and the degree of continuous variable entanglement between two output modes. It is shown that quantum interference survives averaging over all ensembles of disorder and manifests itself as increased photon correlations due to photon antibunching. Furthermore, the existence of continuous variable entanglement correlations in a volume speckle pattern is predicted. Our results suggest that multiple scattering provides a promising way of coherently interfering many independent quantum states of light of potential use in quantum information processing.

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