Quantum optics in complex media

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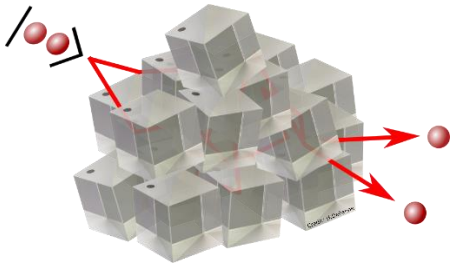
Few years ago, quantum optics crossed the path of light control in complex media when wavefront shaping was used to guide photon pairs through a multimode fiber and a scattering layer [1,2]. These seminal works highlighted the potential of quantum optics experiments in complex media and raised new technological and conceptual challenges. In this presentation, I will present the recent progresses made in harnessing optical disorder for processing quantum information. Specifically, I will describe the use of a multimode fiber as a programmable linear optical network for quantum computing [3] and detail our ability to transport spatial entanglement without disturbance for secure communication [4]. Finally, I will discuss challenges and perspectives of imaging through scattering media using quantum states of light.



Two-photon state in randomly distributed beam splitters (scattering medium)

References:

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[2] Wolterink, T. A., Uppu, R., Ctistis, G., Vos, W. L., Boller, K. J., & Pinkse, P. W. (2016). Programmable two-photon quantum interference in 10 3 channels in opaque scattering media. *Physical Review A*, *93*(5), 053817.

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