Tailoring the axial resolution in induced coherence tomography

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Abstract

Induced coherence tomography is a novel axial imaging technique with potential applications. The technique offers the advantage of probing a sample with infrared photons more convenient for deeper penetration into biological samples, while using the optimum wavelength for the detection system. It uses the notion of induced coherence between two pairs of downconverted photons to infer the reflectivity profile of the sample by measuring the degree of first-order coherence. The resolution of the system is defined by the length of the crystals implemented in the generation of the photon pairs. Short crystals and continuous wave pumping give high resolutions but generate small photon fluxes, this implies long record times in the measurements. In this work, we present how the use of ultrashort pump laser pulses (fs) in combination with long nonlinear crystals allow to achieve high axial resolutions with a high emission rate of photon pairs and therefore short record times. The study of the fundamental factors that define the axial resolution of the induced coherence tomography is in [1].

References

[1] Rojas-Santana, A., Machado, G. J., Lopez-Mago, D., & Torres, J. P. (2020). Is quantum entanglement necessary for observing induced coherence between photons generated in separate biphoton sources?. *arXiv preprint arXiv:2005.03741*.