TRR 142
Tailored Nonlinear Photonics

TRR Guest Scientist Lecture / Seminar

Date/Time: 06.12.2016 / 11am
Location: UPB P8.4.09

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Temporal imaging with squeezed light

Abstract:
Temporal imaging is a technique that enables manipulation of temporal optical signals in a manner similar to manipulation of optical images in spatial domain. It uses the notion of space-time duality with dispersion phenomena playing the role of diffraction and quadratic phase modulation in time acting as a time lens.

In this work we address the problem of temporal imaging of a temporally broadband squeezed light generated by a traveling-wave optical parametric amplifier or a similar device. We consider a single-lens temporal imaging system formed by two dispersive elements and a parametric temporal lens, based on a sum-frequency generation process. We derive a unitary transformation of the field operators performed by this kind of time lens.
We evaluate the squeezing spectrum at the output of the single-lens imaging system and find the conditions preserving squeezing in the output field. When the efficiency factor of the temporal lens is smaller than unity, the vacuum fluctuations deteriorate squeezing at its output. For efficiency close to unity, when certain imaging conditions are satisfied, the squeezing spectrum at the output of the imaging system will be the same as that at the output of the OPA.

This scheme gives the possibility of matching the coherence time of the broadband squeezed light to the response time of the photodetector. We finally discuss a temporal imaging scheme which allows to partially compensating the frequency dispersion of the OPA.

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