Super-Thermal Light Sources for Imaging Applications

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Correlated imaging techniques, such as ghost imaging, differential ghost imaging, or sub-shot noise imaging, require spatially correlated pairs of light beams, the correlations being either classical or quantum in nature: The larger the amount of correlation, the higher the visibility of the image obtained.

The standard source of classical correlations is given by (pseudo-)thermal light generated by a rotating glass diffuser and split in a beam splitter, where the correlation between the beams originates from the fluctuations of the thermal light.

To increase the level of correlation, new sources of classically correlated optical states with higher fluctuations and superthermal statistics can be developed. Here we present and discuss two superthermal light sources. The first is obtained by upconversion of a pseudo-thermal speckle pattern in a nonlinear crystal, while the second, more efficient and easier to manipulate, is produced by passing laser light through a sequence of diffusers.