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Bichromatic Local Oscillator for Detection of Two-Mode Squeezing ALBERTO M. MARINO, University of Rochester, VINCENT WONG, ROBERT W. BOYD, C.R. STROUD, JR. —

In recent years two-mode squeezing has become an active area of research as a source of continuous variable entanglement and EPR correlations; however, the experimental characterization of two- mode squeezed sources still remains a problem. The usual detection scheme, based on heterodyne measurements, requires the use of a local oscillator with a frequency equal to the mean of the frequencies of the two-mode squeezed fields. The squeezing information is then located around the frequency of the beat note between the local oscillator and the squeezed fields. Such frequencies are usually in the GHz range for squeezing from alkali atoms and can in principle be arbitrarily large. The combined requirements of high bandwidth and low noise place difficult constraints on the detection system, since the electronic noise of the system usually increases as the bandwidth of the detection system increases.

We propose the use of a bichromatic field as the local oscillator in the heterodyne measurements. By the proper selection of frequencies of the bichromatic field it is possible to arbitrarily select the frequency around which the squeezing information is located, thus making it possible to use a low bandwidth detection system to characterize a two-mode squeezed source. Since the measurement frequency can be arbitrarily selected, it is also possible to move away from any excess noise present in the system. Experimental implementation of this detection scheme is presented.

Alberto M. Marino
University of Rochester

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