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THEORY AND APPLICATIONS OF TWO-PHOTON QUANTUM OPTICS
(U) NORTHWESTERN UNIV EVANSTON IL DEPT OF ELECTRICAL
ENGINEERING AND COMPUTER SCIENCE H P YUEN 29 OCT 84

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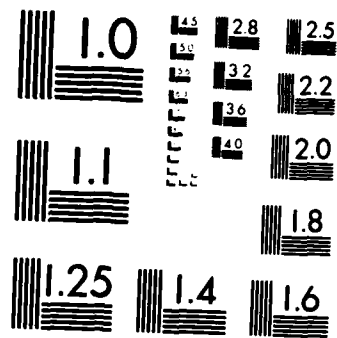
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Principal Investigator:

Horace P. Yuen
Professor of Electrical Engineering and Computer Science
Northwestern University
Evanston, Illinois 60201

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Scientific Problem:

The basic problem is to discover an optical system which yields large readily observable squeezing. Another main goal is to explore the possible utilization of squeezing, both in precision physics measurements and in practical technological applications.

Approach:

The discovery of optical systems exhibiting large observable squeezing is being attempted in two ways. The first consists of a general operator analysis on the mechanism of squeezing generation, to explore possible novel optical systems that may yield large squeezing. In the second method, new quantum optics techniques are developed for detailed analysis of coupled matter-field systems that are known to exhibit squeezing, in order to understand how certain imperfections in real systems can be overcome.

Progress:

A multimode TCS formalism has been developed for identifying squeezing in an optical system. The possibility of generating readily observable squeezing in feedback type systems is being investigated, which looks promising and significant. A general theory for characterizing squeezed states in contradistinction with two-photon coherent states has been obtained.

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THEORY AND APPLICATIONS OF TWO-PHOTON QUANTUM OPTICS

Horace P. Yuen
Professor of Electrical Engineering and Computer Science
Northwestern University
Evanston, IL 60201

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PAPERS PUBLISHED IN REFEREED JOURNALS

- (i) H. P. Yuen, "Respond to Comments by K. Wodkiewicz," Physical Review Letters, Vol. 52, 1984, p. 788.
- (ii) H. P. Yuen, "Respond to Comments by R. Lynch," Physical Review Letters, Vol. 52, 1984, p. 1730.

BOOKS (AND SECTIONS THEREOF) SUBMITTED FOR PUBLICATION

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BOOKS (AND SECTIONS THEREOF) PUBLISHED

in Coherence and Quantum Optics V, ed. by L. Mandel and E. Wolf, Plenum, N.Y., 1984.

- (i) P. Tombesi and H. P. Yuen, "Enhanced Squeezing in an Optically Bistable Two-Photon Medium," pp. 751-754.
- (ii) H. P. Yuen, "On the Observation of Squeezing and Sub-Poissonian Photon Statistics by Homodyne Detection," pp. 755-760.

INVITED PRESENTATIONS AT TOPICAL OR
SCIENTIFIC/TECHNICAL SOCIETY CONFERENCES

H. P. Yuen, "Squeezing and Its Applications," presented at U.S.- Japan Seminar on Coherence, Incoherence, and Chaos in Quantum Electronics, August 30 - September 4, 1984, Nara, Japan; pp. 39-41 of seminar program.

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