Observation of squeezed noise produced via forward four-wave mixing in sodium vapor.

By Mari W. Maeda, Prem Kumar, and Jeffrey H. Shapiro, Research Laboratory of Electronics, Massachusetts Institute of Technology. To be published in the March issue of Optics Letters.

Researchers at the Massachusetts Institute of Technology have performed a squeezed-state generation and detection experiment in atomic sodium vapor. Their observations mark the first production of squeezed-state light in a Doppler-broadened medium.

Squeezed-state light is a radiation field without a classical analog whose noise is optically phase sensitive with a minimum below that of a coherent state.

Optical phase-sensitive noise with a minimum falling 4% below the shot-noise limit was observed, the MIT scientists report. To accomplish this, they used a forward four-wave mixer with a probe/conjugate output beam combination, balanced-mixer homodyne detection, and spectrum analyzer observation.

The "key" to producing squeezed-state light using this method is to combine the probe and conjugate output beams on a lossless 50% beam splitter, they explain.

In the MIT experiment, a continuous wave dye laser beam was split to yield an LO beam, two pump beams (20–50 mW each), and an input probe beam. The pump and probe beams were focused to a diameter of about 0.5 mm in a sodium cell in a forward four-wave mixing geometry.

Measurements were made at sodium cell temperatures between 210 and 230°C. Prior to making noise measurements, the MIT group optimized conjugate-beam spatial quality by adjusting pump detuning and pump/probe beam angles. As was expected, output probe-beam noise was time and frequency independent at a value slightly above the vacuum state (shot noise) level.

The MIT researchers estimate that the 0.2-dB observed noise reduction corresponds to 0.6 dB of actual squeezing. Moreover, they conclude, actual squeezing may have been even higher because the sampling time used in their scheme was comparable to the phase-fluctuation coherence time so that the true noise-minimum may not have been observed.

—*George Leopold*

ISO vision standards

There are times when the physical science side of OSA tends to forget about our members interested in vision. The same is true with standards, but we intend to give equal time this month.

The Ophthalmic Optics subcommittee, ISO/TC172/SC7, has issued two draft international standards dealing with tests for visual acuity. DIS 8596 defines a standard "optotype," the Landolt ring, a visual artifact that looks like a fat letter "C." The width of the ring and the width of the gap are one-fifth the outside diameter of the ring. This standard also defines a visual acuity grade that is the inverse of the width of the ring in minutes of arc from the observer's viewing position. The designated acuity grades form a geometric progression with a ratio of the tenth root of ten, or approximately 1.26.

The other draft, DIS 8597, defines a standardized testing procedure to obtain correlations between other visual optotypes used for visual acuity testing and the Landolt ring. It appears that the eye chart with the big "E" may be giving way to a chart with Landolt rings in various orientations of the gap. This will permit an international standardization of visual acuity.

Copies of these draft international standards are available from the American National Standards Institute (ANSI) or William Borrelle at OSA. Comments should be forwarded to the leader of the U.S. TAG for SC7, Charles Campbell, Humphrey Instruments, 3081 Teagarden, San Leandro, Calif. 94577.

In another area of optical standardization, ISO/TC97/SC23, Information Processing Systems/Optical Disk Standardization, is proposing two coexisting formats as standards. These two formats are the "continuous servo" format and the "sampled servo" format. Further information on this continuing work is available through the secretariat for TC 97, ANSI. Work will also be starting on formats for erasable optical disks.

Closer to home, Ronald Kimmel has succeeded Manfred Grindel as chair of the OSA standards committee. Kimmel can be contacted at Hughes Aircraft Co., Building E54, M.S. F212, P.O. Box 902, El Segundo, Calif. 90245. Manfred Grindel deserves credit for vitalizing the OSA standards committee by instituting full-day meetings two or three times a year. Kimmel will continue this tradition by having the first 1987 OSA standards meeting on Monday, May 18 in Orlando, Fla., in conjunction with the SPIE meeting. Anyone interested in optical standards is welcome to attend. The agenda will include reports from the ISO/TC172/SC1 meeting, Optics and Optical Instruments, taking place in Thun, Switzerland, May 12–15.—Robert E. Parks