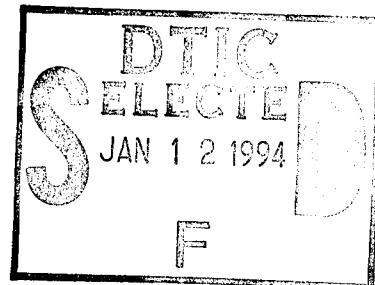


UNM

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1994 December 23



Dr. Herschel S. Pilloff
Chemistry and Physics Division (Code 331)
Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5660

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Dear Hersch,

This letter constitutes the annual report of work carried out under ONR Grant No. N00014-93-1-0116 (R&T No. 4124112-08) at the University of New Mexico during the period 1993 December 1 to 1993 November 30.

During the reporting period five people were directly associated with my research group at UNM. Rüdiger *Schack* continued as the Center for Advanced Studies Postdoctoral Fellow at UNM, working mainly on topics not directly related to this grant; *Schack* left UNM on November 1 to become a postdoc in Ian Percival's group in London. Shang *Song*, USC graduate student, completed her Ph.D. in Physics in 1994 February, working on topics directly related to this grant; she has now accepted a position with Chase Manhattan Bank. Chris *Fuchs* and Howard *Barnum*, UNM graduate students, continued in my research group, both working on topics associated with this grant. *Fuchs* should finish his Ph.D. thesis during this academic year. Dierk *Steinbach*, graduate student from the University of Ulm, joined my research group in 1994 August.


In addition to the above personnel, several visitors were brought to UNM under the auspices of the Center for Advanced Studies: (i) Gerard Milburn of the University of Queensland visited for a brief period in May (and will return for a four-month sabbatical in the spring of 1995); (ii) Samuel Braunstein of the Weizmann Institute visited for two months beginning in mid-May, working directly with *Barnum*, *Fuchs*, and me on topics supported by this grant; and (iii) Gershon Kurizki of the Weizmann Institute visited for a month beginning in mid-August, interacting with my group on various topics in quantum optics.

Research during the reporting period was concentrated in the following areas:

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During the reporting period *Caves* was an invited speaker at the Sixth New Zealand Symposium on Quantum Optics, held in Rotorua, New Zealand, 1994 January 24–28, at the International Conference on Fundamental Problems in Quantum Theory, held in Baltimore, 1994 June 18–22, and at the Fourth Drexel Symposium on Quantum Nonintegrability: Quantum-Classical Correspondence, held in Philadelphia, 1994 September 8–11. Braunstein was an invited speaker at the International Workshop on Quantum Communications and Measurement, held in Nottingham, England, 1994 July 11–16, where he reported on joint work with Caves supported by this grant.

Sincerely,



Carlton M. Caves

CMC/TEX

Publications published

1. C. M. Caves and P. D. Drummond, "Quantum limits on bosonic communication rates," *Reviews of Modern Physics* **66**, 481–537 (1994).
2. S. L. Braunstein and C. M. Caves, "Statistical distance and the geometry of quantum states," *Physical Review Letters* **72**, 3439–3443 (1994).
3. C. A. Fuchs and C. M. Caves, "Ensemble-dependent bounds for accessible information in quantum mechanics," *Physical Review Letters* **73**, 3047–3050 (1994).

Publications submitted

4. S. L. Braunstein and C. M. Caves, "Geometry of quantum states," in *Fundamental Problems in Quantum Theory*, edited by D. Greenberger, *Annals of the New York Academy of Sciences*, to be published.
5. C. A. Fuchs and C. M. Caves, "Bounds for accessible information in quantum mechanics," in *Fundamental Problems in Quantum Theory*, edited by D. Greenberger, *Annals of the New York Academy of Sciences*, to be published.
6. S. L. Braunstein and C. M. Caves, "Geometry of quantum states," in *Quantum Communications and Measurement*, edited by R. Hudson, V. P. Belavkin, and O. Hirota (Plenum, New York, to be published).
7. C. A. Fuchs and C. M. Caves, "Mathematical techniques for quantum communication theory," in *Quantum Communications and Measurement*, edited by R. Hudson, V. P. Belavkin, and O. Hirota (Plenum, New York, to be published).

