

$$\begin{pmatrix} \cos^2 \varphi' + i \cos \varphi' \sin \varphi' (1 + \cos \theta') \\ \sin^2 \varphi' + i (\sin^2 \varphi' \cos \theta' - \cos^2 \varphi') \\ 0 \\ \sin \varphi' \sin \theta' \\ \sin \varphi' \sin \theta' \\ 0 \end{pmatrix}.$$

Freedman at Berkeley have
 experiment with S_{qm} but in dis-
 crepancy with S_{hv} - a strong dis-

of Quantum Mechanics
 sche Grundlagen der Quan-

6, 827 (1963).
 1957).

A. Holt: *Phys. Rev. Lett.*,

Rev., 47, 777 (1935).

and also from Dr. E. Guth,

ms and Predictions, edited

ch., 17, 59 (1967).

ecture at the Boston Collo-
 1970.

Question," in *Foundations*
 Academic Press, New York,

ussed by A. Peres and P.

50).

s thesis, Boston University

ble theories by means of a
 imental Test of Quantum
 unations of Quantum Me-
 w York, 1971), pp. 195-210.
 assumption that the results

Test of local hidden-variable theories

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obtained in a Compton-scattering experiment are related correctly by quan-
 tum mechanics to the results of an ideal linear polarization analyser. Al-
 though this assumption is reasonable, it could be challenged by an advocate
 of local hidden-variable theories who wishes to account for experimental re-
 sults favoring quantum mechanics.

- [17] C. A. Kocher and E. D. Commins: *Phys. Rev. Lett.*, **18**, 575 (1967).
- [18] This discrepancy is exhibited in detail in Horne's thesis (ref. [15]) by a quite
 different method from the one used here.
- [19] Calculations by R. A. Holt, to be presented in his thesis, Harvard University,
 1972, show that there is no discrepancy between the quantum-mechanical
 predictions and Bell's inequality in the case of cascades from atoms having
 nuclei with nonzero spin.
- [20] A. I. Akhiezer and V. B. Berestetsky: *Quantum Electrodynamics*, Sect. 4
 (Washington, D.C.).
- [21] The assumption of a point source is also an idealization. For a discussion of
 the more realistic case of a line source, see Holt's thesis, ref. [19].
- [22] See ref. [6] and ref. [15].
- [23] L. de Broglie: *Nonlinear Wave Mechanics* (New York, 1960); also *Ondes*
électromagnétiques et photons (Paris, 1968), and other publications.
- [24] For example, D. Bohm: *Phys. Rev.*, **85**, 166, 180 (1952).

COMMENT

The question raised in the third paragraph of Section 1 was cleared up by
 a conversation with Prof. Peter G. Bergmann around 1980. He recalled a
 discussion with Einstein and Valentine Bargmann around 1938 at the In-
 stitute for Advanced Study, during which Einstein took von Neumann's
 book from the shelf and pointed to premise B' of von Neumann's theo-
 rem (in Section 1 of Chapter IV): "If $\mathcal{R}, \mathcal{S}, \dots$ are arbitrary quantities and
 a, b, \dots real numbers, then $\text{Exp}(a\mathcal{R} + b\mathcal{S} + \dots) = a \text{Exp}(\mathcal{R}) + b \text{Exp}(\mathcal{S}) +$
 \dots ." Einstein then said that there is no reason why this premise should
hold in a state not acknowledged by quantum mechanics if \mathcal{R}, \mathcal{S} , etc. are
not simultaneously measurable. Einstein's criticism is essentially the same
 as those of Siegel, Jauch and Piron, Bell, and Kochen and Specker nearly
 thirty years later.