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OF THE WEEK

RESEARCH NOTES

ARTICLES

DEPARTMENTS

COVER: Physicists' present description of the "elementary" particle demands a paradoxically extensive array of particle traits (quantum properties). Baryons, mesons, leptons, and photons are distinguishable from one another in part by possessing their own peculiar combination of properties. Besieged physicists have resorted to whimsically imaginative labels for these endowments like the latest: "charm," "flavor" and "color." See p. 408. (Drawing: David Suter)

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LETTERS

On acceptable risk

Your article on "Acceptable Risk" (SN: 4/24/76, p. 263) surely points out a very important principle: If the effect of a cause is so small that it cannot be measured, it is not worth worrying about.

In our highly scientific and technical society, we are able to measure very small quantities of almost anything. Theoreticians then work with these very small quantities, call them causes, and conclude that there must be an effect. Pure researchers are then only too eager to measure the negligible effect and appear to be very ready to threaten us with doom if the relationship between cause and effect is not established. This is the wrong way of making progress.

Lionel H. Brooks
Leucadia, Calif.

No real paradox

It appears to me that the Einstein-Rosen-Podolsky paradox, as described by Dietrick E. Thomsen in the May 22 SCIENCE NEWS, is no real paradox at all, but is just a bit of semantic sleight-of-hand. According to Thomsen, "If the photon passes and is detected, the experimenter immediately knows how his opposite number 10 or 15 light-years away must have set his polarizer to pass his photon."

In actuality, the experimenter *knows* nothing of the sort. He simply *believes* that this is what the other person did, making an inference based on previous information. The only thing he knows is that the positronium emitted two photons some time in the past and that he has detected one of them. He then *infers* that the other was detected 10 light years away. In actuality the other photon might have been absorbed in a passing star, or the other observer might have died during the ten years since the agreement was made. In other words, no information at all has passed between the two observers. The path of information flow is along the world line from the annihilating positrons to the two observers.

A similar kind of situation arises if you send a message by radio from earth to a number of distant stars. The stars can be many light-years from each other, but since they are equidistant from the earth they all receive the message simultaneously. If the message states that "The people on stars A, B, and C are receiving this message simultaneously," then those on star A know immediately what those on star B are reading. Would you say that information has traveled faster than light from B to A? Certainly not. Information has gone from earth to A and to B and to C at lightspeed. It has not gone from B to A.

For more examples of seemingly paradoxical situations, see my article "Things that go Faster Than Light," in the July 1960 SCIENTIFIC AMERICAN.

I am surprised that after all this time people are still worrying about these fake paradoxes.

Milton A. Rothman
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Rejecting the alternatives offered by Dirac and Heisenberg, I believe that Bohr refused in effect to countenance a view of science as either the *creation* of reality or the *discovery* of a reality already there in itself. Quantum mechanics does make the observer a participator, but I think that in Bohr's view this does not mean that the observer's choices ". . . will determine what he finds." Thomsen's article, however, leaves one with the impression that the only alternative to the classical definition of reality as an objective *fact* is the one in which it is a subjective *idea*. Reality may have ". . . no objective existence apart from the act of observation," but the act of observation neither constitutes nor determines that reality. The participation of the observer, then, is best understood as a dialogue in which the experimental procedures are questions put to nature and in which nature plays its part both as listener and speaker. Quantum mechanics, particularly in Bohr's interpretation, is, therefore, a radical challenge to both realist and idealist visions of the theory and practice of science.

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No annual effect

In a letter in your May 22 edition, J. F. Messina raised the possibility that I might be observing an annual variation in G, in my experimental measurements of the gravitational constant (SN:9/17/76, p. 244).

This cannot be the case because I compare the value of the gravitational constant at a mass separation of 29.9 cm with the value of the gravitational constant at a mass separation of 4.48 cm over a period of a few hours. The comparisons were sequentially sandwiched in time and all of the measurements given in the figure in NATURE (Vol. 260, 1976) were taken in August 1975. Hence, there is no possibility that some annual effect could be operative here.

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