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letters

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in 1973. The diurnal variations⁴ of the OH concentration in air were first measured at Ford in 1974. To this date, Ford is still the only organization that has been able to make any measurement of the OH concentration anywhere below 30 km in the atmosphere.^{5,6}

With regard to current activities, Ford has a contract with NASA Ames Research Center to study the feasibility of OH measurements at an altitude of 20 km in the atmosphere using the technique of laser-induced fluorescence. The NSF grant on the spectroscopy of OH, H₂O, and HO₂ referred to in the article is for a graduate student to work at Ford under the joint supervision of myself and J. F. Ward of the University of Michigan.

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More lights in the sky

Over the past two years several letters have appeared in PHYSICS TODAY in which the authors have discussed the possible origins of some randomly occurring lights in the sky (Epstein, March 1974, page 15; Rutledge, September 1974, page 11; Heaton and Epstein, February 1975, page 11). In view of these letters, and especially in view of Epstein's suggestion (February) that antimatter meteorites could conceivably last up to several minutes and describe somewhat complex (Brownian) motion in Earth's atmosphere, I would like to recount a recent observation made by three witnesses, one of whom is a technically competent civilian employee of a military installation near Washington, D.C.

The witnesses reported seeing two bright, apparently self-luminous, circular objects at midday when the sky was cloudless, empty of aircraft, balloons, and so on, and the visibility was about twenty miles according to the weather records of the date and time. The objects were observed to descend "from the blue" one after the other, and re-

main at a fixed angular altitude for a time estimated to be a minute or more. During this time the observers noted faint dark rings about the central bright regions. The second appearing object then executed a left-right, zig-zag motion and then rose rapidly "straight up." Moments later the first appearing object also began a rapid uniform, apparently vertical, ascent. The object shrank visibly in apparent size as it ascended and was lost to sight nearly directly overhead. The brightness of the objects were reported to be constant throughout the sighting. The angular subtense of each object when at its lowest angular elevation of 25° has been estimated to be at least 1 milliradian but no greater than 10 milliradians. Unfortunately, it was not possible to estimate the distance to the objects.

It is difficult to decide what to make of a report such as this. If the objects had been observed to disappear after their descent, one could argue that the observation is roughly consistent with the antimatter meteor hypothesis of Epstein. However, the final ascent of the objects seems to conflict with this suggestion. In any case, the observational data are quite good and provide useful information with which to test any alternative hypothesis. A more complete report is available from the author.

BRUCE S. MACCABEE

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Comment on book review

I should like to comment on Wolfgang Rindler's review of my book, *Ideas of the Theory of Relativity* (March, page 48). The reviewer said that the author "thinks, for example, that . . . (6 points) . . ." Of these, two were erroneous as to what I think. (1) In explaining the idea of spatial curvature, I said that from the outside of the surface of a sphere, it has positive curvature (convex) and from the inside it has negative curvature (concave), in order to demonstrate how a curved surface in Euclidean space is not comparable with the curvature of a Riemannian space, which can be positive from all spatial locations. (2) I did not say that the Robertson-Walker metric is the de Sitter metric! I did say that the R-W metric has the form

$$(ct)^2 - R(t)^2 L^2$$

with $R = r_0 e^{Ht}$, but I did not specify the functions r_0 and L , except to say that they are independent of t . My only point there (and independent of what you call this form of the metric) was that such a space-time singles out a cosmological (absolute) time coordinate—that is, its measure is the same in all reference frames. I then concluded that this form is not in accord with the

full covariance requirement of general-relativity theory, even though it does incorporate the Hubble law.

On the other four points, such as my conclusion that the Lorentz contraction does not imply an actual physical contraction of a material rod (because the Lorentz transformations are not cause-effect relations)—yes, I do think these things. But I did show how these ideas follow logically from the view of space-time as a *subjective* language, whose purpose is to facilitate an expression of *objective* laws of nature. But merely to say that the author is no expert because—"He thinks that..."—and to issue warnings that "publishers should be more selective" and "the innocent reader should beware," *does not scientifically refute anything!* These warnings are indeed in the same class as dogmatic warnings that we (painfully) hear today, referring to the danger of "bourgeois" ideas, or the warnings (of 40 years ago) about the corrupting power of "non-Aryan physics," or (of 400 years ago) of "heretical natural philosophy." Along with the variety of adjectives in these different periods came the same warnings: "the innocent reader should beware." However, the fact is that we do live in a free world today, in the West, and the reader doesn't need Rindler to protect him from dangerous and corrupting ideas! He is indeed capable of thinking for himself and making up his own mind about the scientific validity of ideas. Therein lies my optimism for the future.

MENDEL SACHS
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Good news on death

In a recent letter John F. Davis (July 1975, page 11) suggested that physicists died at an early age compared to the US white male average. This conclusion was based on an analysis of 192 obituaries in *PHYSICS TODAY* from August 1969 to January 1975. He calculated the average age of death to be 64 which seems vaguely small compared to the white male life expectancy of about 69. It was pointed out to me by M. Bolsterli that the average age of death is a rather meaningless number. For example, suppose we have a group of people, all 40 years of age in a given year; if some died during the year, the average age of death of the people who died would be 40, but this number says nothing concerning life expectancy. Clearly the average age of death in a group of people, over a short time period, depends strongly on their age distribution.

I have performed the following calculation: Assuming that the age distribution of physicists in 1968 was roughly that of science PhD's and using the 1968 death rates for US white males

from the 1971 Reader's Digest Almanac, I calculate the *expected* average age of death to be 57. In the above calculation it was assumed that the distribution of physicists between 70 and 85 years of age was that of the US white male population. Since the average age of death calculated by Davis was 64, neglecting error bars, we may conclude that physicists live longer than the average white male.

Finally, we should note that immortality is not ruled out by the data. (One example of immortality would invalidate all previous theories of life expectancy.) Since this possibility would have enormous implications on retirement and tenure practices in universities and industry and I feel that large sums of money should be spent on further studies of the type presented in this note.

R. AARON
Northeastern University
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Rhymes, for different times

As I told it to my children on a vacation in Florida in 1932: "The Sun is Good for you."

Sun and Sand

Little photons from the sky
Fall upon us or we die.
So we lie upon the beaches,
Where the quanta "h-nu" reaches
Energy sufficient to
Put D-vitamins in you.

As I now tell it to my grandchildren in 1975: "The Sun is Bad for you."

Ultraviolation

Freon rising with our prayers
Damages Earth's upper layers.
Strong quanta through the ozone
passes
Burning hides right off our asses.
Such photons falling through the sky
May make some of us sooner die.

W. L. EVERITT
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Why "B"?

If anyone should happen to know how the symbol *B* became adopted for the magnetic field, I would appreciate the pertinent references.

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Correction

January, page 26: In figure 1, the labels for the hydrogen- and helium-burning rates are interchanged; they are also identified incorrectly in the caption. The gray line represents the hydrogen-burning rate and the black line, the helium-burning rate. □

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