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letters

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fundamental theory of physics,¹ as a necessary relation between the radius of the universe ρ_0 the Compton wavelength of the proton λ_0 and the total number of protons in the Universe n_0 , such that

$$\rho_0 / 2\pi\lambda_0 = (n_0)^{1/2} \approx 10^{40}$$

The theory starts with a set of dimensionless linear wave equations of the n_0 identical elementary particles in the $4n_0$ -dimensional representation space of the closed universe. These equations do not allow any adjustable constant except n_0 . The meaning of the equations is that the n_0 elementary particles are hypothesized to be built out of waves traveling at the speed of light. For the wave function to be stationary¹ it becomes necessary that the fundamental frequency of each particle is n_0 . With a wave speed of unity, the wave length $2\pi\lambda_0 = 1/n_0$. The radius of the three-dimensional universe is $\rho_0 = 1/(n_0)^{1/2}$, and this yields the relation given above. It is a reasonable assumption to identify the elementary particle of our theory with the proton, or hydrogen atom, because all stable systems of the theory have a rest mass close to a whole multiple of the elementary particle, as all stable systems in the real world (atoms, molecules) are close to a whole multiple of the proton.

It is noteworthy that the wave equations of the theory are made dimensionless by writing $t(d/dt)$ instead of (d/dt) , and that this leads to a beginning of time, and a size of the universe, which oscillates, $\rho_0 = t^i$, at a speed of the order of the speed of light.

Reference

1. P. J. van Heerden, "The Foundation of Physics," Wistick, Wassenaar, Netherlands (1967), page 85.

P. J. VAN HEERDEN
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More on Levich

It is impossible not to sympathize with Benjamin Levich (March, page 9) and his Soviet colleagues but, at the same time, I am totally dismayed by the shortsightedness displayed by them and their Western supporters. All the concern and emphasis is on Soviet oppression of Jews and "intellectuals" of various types. These are just the most evident victims of Soviet policy and to dwell on the particulars is to ignore and evade the fundamental issue.

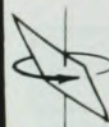
Levich *almost* touches on this issue in his letter when he asks: "Are scientists free human beings? Or are they the property of the government?"

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Rather, the issue is: Are human beings free or are they the property of the government (or society)? Not just scientists or Jews but every single "citizen" of the Soviet Union. The oppression of a particular group is just a manifestation of the general Soviet policy of the suppression of all individual rights. It is on the basis of this fundamental requirement of freedom that the fight must be waged.

Let us progress beyond the relatively easy task of supporting individual cases and concentrate on the source of the problem, which is the nature of the Soviet system. Here I am not limiting the problem just to the practical aspects of their present system but also include the professed ideals behind that system; the present actuality is the only possible result of those ideals. Sadly, there are many individuals who can serve as example but, as long as the root evil remains, examples will be never ending. The proper response of intellectuals is to undertake the task of persuading the civilized population of the world to apply moral and economic sanctions against the Soviet system until it frees all its "citizens."

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Gravity waves

I should like to add a few comments to Jonathan Logan's well written and informative article, "Gravitational Waves—A Progress Report," (March, page 44). Unfortunately, gravitational-wave receiving antennas, like their electromagnetic counterparts, obviously suffer gross inefficiency when they are small compared to a wavelength of the radiation. In addition to this, the mechanical antennas presently in use seem to be unusually insensitive when we consider that Joseph Weber reported¹ a flux density of about 10^2 ergs/cm² sec or 0.1 watts/m², only 10^{-4} orders of magnitude less than the solar constant at one AU. This flux density is equivalent to the intensity of ten moons in intensity, a sight that would prove difficult to miss with our large (as compared to a wavelength) eyes. The difficulty with detectors using shear waves is evidently traceable to the gross impedance mismatch, a fact that seems to follow from Freeman Dyson's calculation for the coupling constant.² This mismatch is in sharp contrast to antennas used for the detection of electromagnetic waves.

The level of gravitational-wave power density required to produce even the small, nearly insignificant, space warp of 10^{-16} cm over a distance of 10 meters at a frequency of 1.6 KHz, is a truly amazing 0.1 watts/m². Even more so is the fact that the universe

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