

Space-Time Time

- Special relativity with Ralph Alpher, one of the creators of the big bang.

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Letters to the Editor

PUBLICATION of brief reports of important discoveries in physics may be secured by addressing them to this department. The closing date for this department is five weeks prior to the date of issue. No proof will be sent to the authors. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents. Communications should not exceed 600 words in length.

The Origin of Chemical Elements

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February 18, 1948

AS pointed out by one of us,¹ various nuclear species must have originated not as the result of an equilibrium corresponding to a certain temperature and density, but rather as a consequence of a continuous building-up process arrested by a rapid expansion and cooling of the primordial matter. According to this picture, we must

We may remark at first that the building-up process was apparently completed when the temperature of the neutron gas was still rather high, since otherwise the observed abundances would have been strongly affected by the resonances in the region of the slow neutrons. According to Hughes,² the neutron capture cross sections of various elements (for neutron energies of about 1 Mev) increase exponentially with atomic number halfway up the periodic system, remaining approximately constant for heavier elements.

Using these cross sections, one finds by integrating Eqs. (1) as shown in Fig. 1 that the relative abundances of various nuclear species decrease rapidly for the lighter elements and remain approximately constant for the elements heavier than silver. In order to fit the calculated curve with the observed abundances³ it is necessary to assume the integral of $\rho_0 dt$ during the building-up period is equal to 5×10^4 g sec./cm³.

On the other hand, according to the relativistic theory of the expanding universe⁴ the density dependence on time is given by $\rho \approx 10^9/\beta$. Since the integral of this expression diverges at $t=0$, it is necessary to assume that the building-up process began at a certain time t_0 , satisfying the relation:

$$\int_{t_0}^{\infty} (10^9/\beta) dt \approx 5 \times 10^4, \quad (2)$$

which gives us $t_0 \approx 20$ sec. and $\rho_0 \approx 2.5 \times 10^4$ g sec./cm³. This result may have two meanings: (a) for the higher densities existing prior to that time the temperature of the neutron

- Riemannian Geometry of Orbifolds PhD



Inconsistency in Mercury's Orbit

- Newton used solar gravitational attraction and calculus to explain Kepler's elliptical planetary orbits.
- The orbit rotated (precessed) at an unexpected rate

January 7, 1943

Dear Barbara:

I was very pleased with your kind letter. Until now I never dreamed to be something like a hero. But since you have given me the nomination, I feel that I am one. It's like a man must feel who has been elected by the people as President of the United States.

Do not worry about your difficulties in Mathematics. I can assure you mine are still greater.

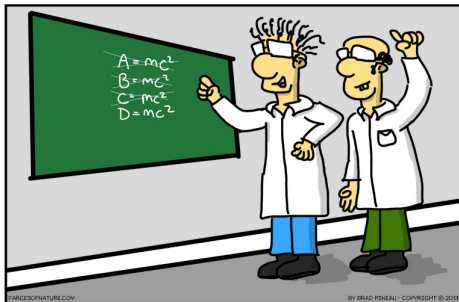
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FARCES OF NATURE



"FRANK! I THINK I'M CLOSE TO SOMETHING HERE!"



Imagine That

- *In the period between the publication of special relativity (1905) and general relativity (1915) he took some time to learn enough differential geometry to develop his ideas. This apparently did not come easily to him, and involved a lot of consultation with other people in Europe. He and Levi-Civita were in very frequent communication for example.*

