crust,[20] or the time back to the melting and layering in Urry's hypothesis. Katcoff's considerations can be applied equally well to a seven-billion-year-old earth, and give an age of the elements slightly greater than that.

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Effects of the Atmosphere on the Penetrating Component of the Cosmic Radiation

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MEASUREMENTS made on the penetrating component of cosmic radiation near sea level for a period of 45 days have been utilized for statistical correlation with data from the daily ascents of two nearby radiosonde stations. The measuring equipment consisted of three trays of G-M tubes mounted as a vertical telescope. The telescope was operated under 12 inches of concrete in floors and roof, and a 10-cm Pb absorber was placed between trays 2 and 3. The pulses from the trays were fed into pulse amplifiers and into a coincidence circuit employing pulse shaping prior to the coincidence measurement. Threefold coincidence pulses were applied to a scaler-pen recorder arrangement which recorded the coincidence through a scale of eight. This allowed continuous monitoring of equipment performance.

To account for the fluctuations of the penetrating intensity at the ground, Duperier[1] introduced the temperature of the μ-meson production layer to be used in addition to the atmospheric pressure and the height of the production layer, the effects of which were already known.[2] According to Duperier's model, the probability that a π-meson will decay into a μ-meson is dependent on the density of the region in which the π-meson finds itself. Therefore, the μ-meson intensity at the ground depends on the temperature of the production region.

The telescope was arranged to have approximately spherical symmetry over the solid angle subtended, so no zenith angle correction was applied. The maximum angular aperture of the arrangement was 17°7′ from the vertical. Hourly counting rates were obtained from the observed data, and the mean rate for each day was computed for the 45 days extending from October 9 to November 22, 1950, which were free from electronic failures.

The mean hourly counting rate, the daily average of the tempertture and height of the 100-millibar level, and the daily mean barometric pressure obtained from the filed radiosonde observations of the Portland, Maine, and Nantucket, Massachusetts, Weather Bureau Stations were analyzed for statistical correlation. A linear regression equation

$$\delta I_c = \alpha\delta T + \beta\delta B + \gamma\delta H \qquad (1)$$

was hypothesized, where δI_c is the deviation of the counting rate from its mean, δT the deviation of the temperature of the 100-millibar level from its mean, δB the deviation of atmospheric pressure, δH the deviation of the height of the 100-millibar level, and α, β, and γ the appropriate coefficients.

Numerical values of the coefficients α, β, and γ were computed by imposing the requirement that $(\delta I - \delta I_c)^2$ be a minimum, where δI_c is the deviation computed from (1) of the counting rate from its mean, and δI the actual observed deviation of the counting rate. Partial correlation and total correlation coefficients were computed using the methods described by Ezekiel.[3] The square of the partial correlation coefficient, $r_{\text{IT.BH}}$, represents that fraction of the variance, or square deviation of the counting rate, which can be accounted for by the temperature of the 100-millibar level with the effects of the other variables theoretically removed. The multiple correlation coefficient, $R_{\text{I.TBH}}$, expresses the extent to which all three independent variables succeed in accounting for the variance of the counting rate. The errors in the regression coefficients are the root-mean-square deviations expected in those coefficients. The following values of the quantities above were obtained:

$R_{\text{I.TBH}} = 0.84$ $\quad \alpha = -0.023(\pm 0.027)$ percent/°C
$r_{\text{IT.BH}} = -0.13$ $\quad \beta = -0.102(\pm 0.011)$ percent/millibar
$r_{\text{IB.TH}} = -0.82$ $\quad \gamma = 0.954(\pm 0.264)$ percent/1000 ft
$r_{\text{IH.TB}} = -0.49$

The significance of the correlation coefficients can be judged from the basis that, if the correlation coefficient were truly zero, 68 percent of the values obtained from 45 days' random sampling would lie in the range $-0.158 = r = 0.158$, or from the fact that if the correlation were truly 0.84, 95 percent of the values obtained from 45 days' sampling would lie in the range $0.64 = r = 0.87$. The correlations of the counting rate and the pressure and the height are significant, while that with the temperature is not. The mean counting rate was 918 coincidences/hour. The expected root-mean-square deviation in the average of 24 such measurements is 6.2. The residual root-mean-square deviation in the counting rate when the effects of the three meteorological variables are removed is 5.9. Assuming exponential absorption of the radiation, the above value of β leads to a mean absorption thickness of 1160 g/cm^2.

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Cross Section for the Reaction $Cu^{65}(\gamma, \alpha)Co^{61}$*

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THE successful determination of the $Rb^{87}(\gamma, \alpha)Br^{83}$ cross section[1] by obtaining the residual activity of Br^{83} has led the authors to undertake the measurement of the $Cu^{65}(\gamma, \alpha)Co^{61}$ cross section by the same method.

Twenty-gram samples of reagent grade $CuCl_2 \cdot 2H_2O$ were irradiated in the University of Saskatchewan betatron beam for periods ranging from 5 minutes at high energies to 90 minutes at low energies. Tantalum strips, used as monitors, were irradiated along with the copper chloride. The irradiated copper chloride was dissolved and, after adding a cobalt carrier, the copper was removed as CuSCN. The cobalt was then precipitated and obtained for counting as CoS. By using a Co^{60} tracer and chemical spot tests, this separation was found to be better than 99 percent efficient.

The activation curve, Fig. 1, was obtained after applying the usual counting corrections. The high energy part of the curve is dotted to indicate that the energy was not as accurately controlled as it was for the lower part of the curve. No attempt was made to obtain activation points at energies lower than 15 Mev. The