experimental results (for example, the B^{10} (n, α) Li^7 reaction) than the Livingston and Holloway curve. Although the published letter does not give any details of the comparison between the predicted and measured results, Dr. Jesse has very kindly sent this information privately. The agreement is very striking for the reactions considered, the differences between the energies obtained from the range–energy curve and those derived independently of ranges being less than 1 per cent of either.

However, there is one point which is not mentioned by Jesse and Sadauskis in their letter, but which has been pointed out by Gilbert[3]. In previous experiments the ranges in standard air of low-energy α-particles have been obtained from measurements, in some suitable gas, of the ranges of these particles and of polonium α-particles. The reduced range has been obtained from the measured ranges without any correction for the variation with velocity of the α-particle of the stopping power of the particular gas relative to air. For the B^{10} (n, α) Li^7 reaction, quoted by Jesse and Sadauskis in support of their proposals, the correction gives an increase of 8 per cent in the α-particle range, and is thus very important when considering modifications to the range–energy curve.

A further interesting feature of this particular reaction is that if the nuclear masses given by Bainbridge[4] are used to calculate the energies of the emitted α-particles, and these energies are used in conjunction with the corrected ranges to give points on the range–energy curve, then the agreement with the original Livingston and Bethe curves[5] is within the experimental error (2 per cent). We are at present attempting to improve the accuracy of measurement of the α-particle ranges in the boron reaction and also to check the magnitude of the stopping-power correction.

This result is, of course, in opposition to the proposals of Jesse and Sadauskis, and if substantiated suggests either that the nuclear masses are incorrect or that the assumption of proportionality between energy and ionization for α-particles in argon is not justified.

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Relative Yields of Ions Produced by α-Particles in Air and Water Vapour

IN continuation[1] of the examination of the radiological properties of water, the yield of ion-pairs in water vapour under the action of α-particles has been compared with the yield in air. A sector-shaped parallel-plate ionization chamber containing either water vapour at 95° C. or air has been exposed to a semi-collimated beam of 5·0-MeV. α-particles derived from a polonium source. A low collecting field (about 50 volts/cm.) is sufficient to produce complete saturation in both gases at pressures of 10–20 cm. of mercury, and several determinations of the relative yield of ions[1] have been made. These have a mean value $\frac{I_{H_2O}}{I_{air}} = 1{\cdot}139 \pm 0{\cdot}006$. Making allowance for possible systematic errors, the corresponding ratio for the energy expenditure per ion pair is taken to be the reciprocal of this figure, $W_{H_2O} = 0{\cdot}878 \pm 0{\cdot}02$. If the value of W_{air} for 5-MeV. α-particles is $34{\cdot}7 \pm 0{\cdot}5$ eV.[2], the value for water vapour is therefore $W_{H_2O} = 30{\cdot}5 \pm 0{\cdot}8$ eV.

Further details of the experiments described above will be published elsewhere.

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Multiplicity in the Hard Component of Cosmic Radiation Underground

IN the course of experiments underground with the penetrating-burst apparatus described in a previous publication[1], we have obtained evidence for the production of groups of penetrating particles at a depth of 60 m. water-equivalent of London clay.

With this apparatus (see diagram), we recorded three-fold coincidences between any one of the fifteen counters *S*, counter *C*, and any one of the eighteen counters *E*. Pulses from the counters *S* and *E* were fed into a hodoscope unit, which indicated the individual counters discharged in bank *E*, and which of the five groups of three counters were discharged in bank *S*.

In 56 hr. 45 min. running time, we recorded 6,806 events, of which $3{\cdot}55 \pm 0{\cdot}22$ per cent indicated the discharge of two or more adjacent counters, and were attributed to knock-on showers accompanying the penetrating particle; a further $0{\cdot}9 \pm 0{\cdot}15$ per cent, however, could not be satisfactorily explained in this manner, as the separations of the counters discharged in bank *E* in these cases varied from one to eleven intervening undischarged counters, with a frequency-separation distribution showing only a slow decrease of frequency with increasing separation.

The above figures have been corrected by subtraction of the measured accidental coincidences.

Considering this result, we are inclined to advance the explanation that a process of production of groups of mesons by mesons is occurring. One may discount explanations based on nucleon primaries, in view of the thickness of earth above the apparatus; and from experiments we have performed with an ion chamber incorporated to select events accompanied by electron showers, we conclude that we may reject any possibility of an appreciable fraction of the coincidences being produced by low-energy photons[2]. Explanation of the process as the production of groups of mesons by mesons is supported by the experiments of Braddick and Hensby[3], who observed pairs of penetrating particles when operating a cloud chamber in this same underground laboratory.

Accepting this hypothesis of meson production by mesons, for which we calculate from our figures a cross-section of 5×10^{-29} cm.^{2}/nucleon, we may suppose the process to be the consequence of radiative