TABLE I.

Altitude (feet)	Pressure (g cm^{-2})	Time (hour)	$A_1B_2C_2$ (counts)	$A_1B_2C_2F_1$ (counts)	$A_2B_2C_2$ (counts)	$A_2B_2C_2F_1$ (counts)	$A_2B_2C_2F_2$ (counts)	$A_2B_2C_2F_3$ (counts)	$A_2B_2C_2F_4$ (counts)
250	1030	308	309	16					
		113.5			25	3			
9500	725	58			174	17	12	10	6
14,000	625	41.5			.293	15	10	9	8

density. The area of each counter is 67.5 cm². If one assumed that all of the showers striking tray F had the same average density, one would calculate this density as being about 220 particles per square meter.

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Development of Thick Emulsions by a Two-Bath Method*

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THE increased use of thick emulsions in nuclear physics has made it desirable to find a satisfactory technique of uniformly developing them. Dilworth, Occhialini, and Payne[1] have described the so-called temperature development method. We are using an alternate method of development on Ilford, C2, 200 u plates, which is probably applicable to even thicker emulsions. The results we have obtained to date might be helpful to others who are using these emulsions.

The method we adapted for our purpose is essentially that described by Crabtree *et al.*[2] which was used for the uniform development of large quantities of motion picture film. In this method the developer is divided into two baths. The first bath contains the developing agent, part of the sodium sulfite and the potassium bromide, but no alkali. The second bath contains all the necessary constituents of an ordinary developer plus an additional amount of alkali. In the first bath the developer diffuses into the emulsion. However, the rate of development is very low because of the lack of alkali. In the second bath the actual development takes place because of the presence of the alkali. It was necessary to add developing agent to the second bath, because not enough can be absorbed from the first bath.

After trying various combinations of the constituents and different times of development we find the following procedure to give the best results.

Step 1: Soak in water for 10 min.
Step 2: Solution A for 30 min. (slight agitation).
Step 3: Solution B for 30 min. (no agitation).
Step 4: 2 percent acetic acid 15 min. (agitation).
Step 5: Fix in F-5 at 74°F with constant agitations 6–8 hours.
Step 6: Wash in running water 2 hours.

Solution A:

Elon	1.1 g.
Na_2SO_3	24.0 g.
Hydroquinone	4.4 g.
KBr	2.0 g.
H_2O to make	2000 cc

Solution B:

Stock D-19	400 cc
H_2O	1600 cc
Additional Na_2CO_3	16 g.

For different batches of the same emulsion, slight adjustments of the developing times and the composition of the solutions may be necessary. The temperatures of the solutions in the Steps 1–4 were all kept constant at 68°F. The temperature of the fixer could also be kept at 68°F. However, it was increased to 74°F to shorten the fixing time.

Because the temperature is kept constant the danger of reticulation is avoided. None of our plates showed any sign of reticulation. Proton tracks in the emulsion had their normal grain density while the background fog was very low. The plates appeared to be uniformly developed throughout the emulsion.

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Thermonuclear Reactions in the Expanding Universe

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IT has been shown in previous work[1–3] that the observed relative abundances of the elements can be explained satisfactorily by consideration of the building up of nuclei by successive neutron captures during the early stages of the expanding universe. Because of the radioactivity of the neutron, and also because neutrons are used in forming the elements, the building up process must have been completed essentially in a time of the order of several neutron decay periods, i.e., about 10^3–10^4 sec. It should be noted that following the essential completion of the main element forming process, the temperature prevailing