A similar result was obtained for lower energy interactions investigated in our laboratory. A group of 45 p interactions with $\langle \gamma_c \rangle = 8$ has $\sigma = 0.6$ while a group of 11 n interactions with $\langle \gamma_c \rangle = 8.3$ has $\sigma = 0.5$.

We think that the smaller interaction anisotropy is not due to inaccuracy in the determination of the axis, because the distribution of particles in a wide cone, which is not very sensitive to the choice of axis, reveals this effect even better than that in a narrow cone. Finally, the random character of the choice of individual events from the literature could have affected our results as shown in the figure to some extent, but in the low energy p and n groups, the method of selection has practically no effect; they were obtained by scanning the same volume of emulsion.

We think that the average anisotropy in the p group is increased by the contribution of interactions produced by mesons, while the n group consists of interactions produced only by neutrons. A more detailed analysis will be published in the Czechoslovakian Physics Journal.

*The authors thank Professor J. Gierula for sending this preprint.

[1] Gierula, Miesowicz, and Zielinski, Nuovo cimento 18, 102 (1960).

[2] Gierula, Haskin, and Lohman, preprint.

Translated by M. Bolsterli

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CONSECUTIVE INTERACTIONS OF HEAVY NUCLEI OF THE PRIMARY COSMIC RADIATION

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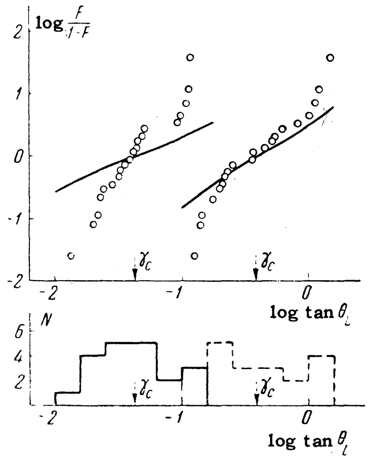
CONSECUTIVE interactions of heavy nuclei, and interactions in a beam of their several fragmentation products ("parallel interactions") are interactions of particles having an identical energy per nucleon, and their investigation may therefore yield information on possible asymmetries in the angular distribution of the particles produced.

We summarize here preliminary results obtained in a stack of nuclear emulsions irradiated during the 1955 Po-valley expedition. We have, so far, found six pairs of consecutive or parallel interactions of heavy nuclei. Their characteristics are shown in the table. N_h denotes the number of evaporation tracks, Z is the charge of the incident nucleus, Z_i are the charges of the fragmentation products, γ_c is determined from the relation $\log \gamma_c = \log \cot \theta_i$, n_1 and n_2 are the number of particles in the narrow and wide cone, respectively, divided by γ_c, and n_1' and n_2' are the number of particles in the cones divided by γ_c', where $\gamma_c' = (\gamma_1\gamma_2)^{1/2}$.

It should be noted that the values of γ_c in separate interactions of a pair differ considerably in

№	N_h	Z	Z_i	n_s	γ_c	$n_1 : n_2$	γ_c'	$n_1' : n_2'$
			Consecutive interactions					
208 a	0	~15	$Z_1=2,\ Z_2=4,\ Z_3=5$	25	23±5	11 : 9	17	15 : 5
208 b	26	2		32	2.6±0.5	17 : 15	2.5	17 : 15
232 a	14	~6	$Z_1=Z_2=2$	30	1.4±0.3	12 : 10		
232 b	1	2		5	3.7±1.8	2 : 2	3.7	2 : 2
203 a	0	~17	$Z_1=Z_2=2,\ Z_3=12$	15	27±7	7 : 7	27	7 : 7
203 b*	16	~12		115	9.5±1	56 : 56	7	65 : 47
207 a	0	~18	$Z_1=2,\ Z_2=13$	9	8.8±3.5	3 : 3	8.8	3 : 3
207 b	4	~13	$Z_1=Z_2=2$	20	4.5±1.3	6 : 5	3.4	6:5
			Parallel interactions					
9	4	~5		47	8.3±1.2	25 : 17	7	26 : 16
227	35	2		38	3.1±0.5	17 : 19	3.2	17 : 19
190	12	2		51	15.5±2.2	22 : 28	18	22 : 28
191	29	~17	$Z_1=4,\ Z_2=Z_3=2$	160	21.6±1.7	80 : 75	17	94 : 61

*The angular distribution of particles for the case 203b has been kindly reported to us by Dr. E. Fenyves from Budapest. The events 203a and 203b are described in reference 1.



Angular particle distribution (top: integral; bottom: differential) for the event 208a and b.

the majority of cases. In the case 208a and b (see figure), and cases 9 and 227, the difference is even greater than three times the statistical fluctuations. Since the energy per nucleon in the laboratory system should be identical for both incident nuclei, this difference in the values of γ_c is the consequence of non-identical effective masses of the interacting nuclei M_1 and M_2 if we assume that they interact as one body. In the event 208a and b, and for a simplifying assumption $M_1(a)/M_2(a) = M_2(b)/M_1(b)$, we find that the ratio of the effective masses is equal to the ratio of $\gamma_c(a)/\gamma_c(b) = 9$. This corresponds to a small N_h and a large Z for the case 208a, but to a large N_h and a small Z for the case 208b. However, the ratio of the effective masses in the case under consideration is unusually large, so that it is difficult to use the hydrodynamical model[2] represented by the solid curves in the integral distributions shown in the figure (upper part).

Using the values of γ_c', we obtain, as a rule, a smaller ratio than when using γ_c, but the forward-backward symmetry in the number of emitted particles ($n_1':n_2'$ or $n_2':n_1'$ respectively) increases, especially in cases with a large anisotropy. Such an asymmetry is observed in the interactions 208a, 9, 191, and others. Evidently, the number of emitted particles is proportional to the effective masses of the interacting particles.

A more detailed analysis will be published in the Czechoslovak Journal of Physics.

[1] G. Biczó, G. Bozóki, E. Fenyves, E. Gombosi, J. Pernegr, and J. Sedlák, Internationale Arbeitstagung ueber die Physik hoher Energien, Weimar, 1960, p. 85.

[2] G. A. Milekhin, JETP 35, 1185 (1958), Soviet Phys. JETP 8, 829 (1959).

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SOUND ABSORPTION IN ROCHELLE SALT CLOSE TO ITS LOWER CURIE POINT

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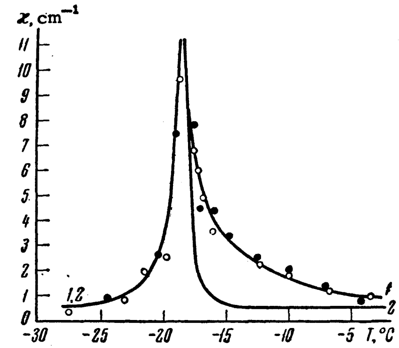
As we have previously reported,[1] there is an anomalously large absorption of transverse elastic waves in Rochelle salt at temperatures close to its upper Curie point ($\Theta = 24°C$); these waves are propagated along the crystallographic z axis and are polarized along the y axis. (The ferroelectric axis of the crystal is directed along x.) Such a sound absorption is the consequence of an increase in the relaxation time which is characteristic of the process of establishing the state of thermodynamic equilibrium in a crystal which is undergoing a second-order phase transition (see below). With the aim of generalizing the result given in reference 1, we carried out measurements of the absorption of a wave of given polarization and frequency $\nu = \omega/2\pi = 5$ Mc/sec in Rochelle salt near its lower Curie point ($\Theta = -18°C$). The results of these measurements are given in the drawing by the curve 1 — 1; the temperature T of the crystal is plotted along the abscissa and the values of the amplitude absorption coefficient κ in cm^{-1} along the ordinate.



The theory of this phenomenon was developed by Landau (see reference 2) who showed that*

$$\varkappa^2 = \frac{\omega^2\rho}{2}\left(\mu\left[1+\frac{8\pi\lambda^2(\mu/\varepsilon+2\pi\lambda^2)}{\mu^2(\varepsilon^{-2}+16\pi^2\omega^2\gamma^{-2})}\right]^{1/2}-\mu-\frac{4\pi\lambda^2/\varepsilon}{\varepsilon^{-2}+16\pi^2\omega^2\gamma^{-2}}\right), \quad (1)$$

where (near the lower Curie point) $\epsilon = \epsilon_x = 4\pi C/(\Theta - T)$ for $T < \Theta$ and $\epsilon = \epsilon_x = 2\pi C/(T - \Theta)$ for $T > \Theta$ is the dielectric constant of the Rochelle salt, ρ is its density, $\mu = \mu_{zyzy}$ is the shear elastic coefficient for constant induction D_x; $\lambda = \lambda_{x,zy}$