The presence of optical branches in the crystal can markedly change the temperature dependence of the effect. In fact, the temperature excitation of optical phonons begins at much higher temperatures compared with acoustic phonons. Therefore, if the role of optical branches in vibrations of the atoms of the j-th type is significant, W_j drops with temperature more slowly compared with the monatomic lattice with the same Debye temperature.

In the limiting case where the optical branches play a predominant role, W_j changes slowly with temperature, so long as kT does not become of the order of the characteristic energy of the optical phonons.

3. To find the frequency spectrum and relative values of the amplitudes of oscillation for different branches, one must solve the eigenvalue problem for the dynamical matrix $C^{\alpha\beta}_{jj'}(\mathbf{f})$.[5] Let us consider a lattice with two atoms in the elementary cell. If for simplicity we assume that the dynamical matrix can be reduced to diagonal form simultaneously for all values of **f** and j, j′, then the qualitative analysis of the vibration problem can be carried through completely.

As $\mathbf{f} \to 0$ for the acoustic branch which corresponds to polarization along the ξ axis, we have

$$V_1^\xi / V_2^\xi = \sqrt{m_1/m_2}, \qquad (4)$$

while for an optical phonon with the same direction of polarization:

$$V_1^\xi / V_2^\xi = -\sqrt{m_2/m_1}. \qquad (4')$$

If $m_1 \gg m_2$, we see that for a heavy atom the contribution to Z_j in (2) for small **f** is due mainly to the acoustical branch, while for the light atom it is mainly from the optical branch. Which situation will hold for arbitrary **f** depends essentially on the nature of the interaction between the atoms. If the interaction between the heavy atoms is greater than all other interactions, so that the inequality

$$|C_{11}^{\xi\xi}(\mathbf{f})| \gg |C_{12}^{\xi\xi}(\mathbf{f})|, \quad |C_{22}^{\xi\xi}(\mathbf{f})| \qquad (5)$$

holds in the fundamental part of phase space, then with increasing **f** the heavy atom "slips over" into the optical branches. Since the phase volume corresponding to small wave vectors is small, Z_j for the heavy atom will be determined for the most part by the optical branches. As a consequence, we get a large Mössbauer effect for a heavy radiator at T = 0, and a weak dependence of the effect on temperature.

The results found give a good qualitative explanation of the observed temperature dependence of the effect.[1,2] Though the elementary cell in SnO_2 and Dy_2O_3 contains more than two atoms, it is obvious that all the arguments remain unchanged.

If the predominant interaction is that between different atoms or the interaction between light atoms, then as $\mathbf{f} \to 0$, just as for arbitrary **f**, in the optical branches the predominant vibration will be that of the light atom. As a result, in such a lattice one will observe a weaker temperature dependence even for the light radiator. The case of a cubic lattice, which is considered in detail in [6], taking account of the interaction with nearest neighbors, corresponds to just this variant.

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POLARIZATION OF LAMBDA HYPERONS GENERATED ON LIGHT NUCLEI BY NEGATIVE 2.8-Bev/c PIONS

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MANY experimental investigations[1,3] were devoted to the polarization of Λ hyperons generated in π^-p and π^--nucleus collisions at pion energies greater than 2 Bev. In a preliminary communication[1] we reported a freon bubble chamber[4] investigation of the transverse polarizations of the Λ particles produced in the reactions

$$\pi^- + A \to \Lambda + K + A' + n\pi, \qquad (1)$$

$$\pi^- + A \to \Sigma^0 + K + A' + n\pi, \quad \Sigma^0 \to \Lambda + \gamma \qquad (1')$$

Number of Λ decays $\Lambda \to p + \pi^-$	Number of negative pions from Λ decays, emitted			$\alpha \bar{p}$	Number of negative pions from Λ decays, emitted in the S plane			$(\alpha \bar{p})'$
	Upward	Downward	In the plane of creation and indeterminate cases		To the right	To the left	Indeterminate cases	
564	242	272	50	−0.11 ± 0.08	277	265	22	0.04 ± 0.08
Including 106 paired cases	41	58	7	−0.32 ± 0.19	54	46	6	0.15 ± 0.19

at 2.8 Bev/c on light nuclei (C, F, Cl). The asymmetry coefficient obtained in this investigation (in 183 Λ-decay events)

$$\alpha\bar{p} = 2(N_\uparrow - N_\downarrow)/(N_\uparrow + N_\downarrow) = -0.30 \pm 0.15$$

resulted in noticeable probability for a negative value of $\alpha\bar{p}$.

To improve the statistics, we analyzed more than 350 additional Λ particles (on top of the 183 decays) registered in a chamber and corresponding to reactions (1) and (1′) at 2.8 Bev/c. The average Λ-particle momentum in the spectrum was 650 Mev/c. The K^0-decay admixture was less than 7 percent of the number of Λ decays. The total number of particles was 564, and 106 events corresponded to bound creation of $\Lambda + K^0$ and $\Sigma^0 + K^0$ in the reactions

$$\pi^- + A \to \Lambda + K^0 + A' + m\pi, \qquad (2)$$

$$\pi^- + A \to \Sigma^0 + K^0 + A' + m\pi, \qquad \Sigma^0 \to \Lambda + \gamma, \qquad (2')$$

where $\bar{m} = 1.2 \pm 0.15$.[5]

The measured values of $\alpha\bar{p}$ are listed in the table. It is seen from this data that slightly more negative pions are emitted downward from the Λ-particle creation plane, but the value of $\alpha\bar{p}$, obtained from 564 Λ decays, is close to zero; on the other hand the value −0.32 ± 0.19, obtained from the paired cases of bound creation $\Lambda(\Sigma^0) + K^0$ is subject to large statistical error. Therefore, as before,[1] we cannot conclude with certainty that $\alpha\bar{p}$ is negative.

We also investigated the right-left asymmetry for the obtained Λ decays. The asymmetry coefficient is in this case

$$(\alpha\bar{p})' = 2(N_\rightarrow - N_\leftarrow)/(N_\rightarrow + N_\leftarrow),$$

where $N_\rightarrow$ and $N_\leftarrow$ is the number of negative pions from Λ-hyperon decay, emitted to the right and to the left of the plane S defined by the vectors $\mathbf{p}_\Lambda$ and $\mathbf{p}_{\pi\,\text{prim}} \times \mathbf{p}_\Lambda$. Such an asymmetry arises if parity is not conserved in the creation of strange particles in strong interactions.[6]

In the latter case the resultant longitudinal polarization of Λ hyperons leads to a front-back and left-right asymmetry. As noted in [7] measurement of $(\alpha\bar{p})'$ excludes the systematic error due to the method used to select the Λ decays. It is seen from the table that no right-left asymmetry is observed, within the limits of statistical errors.

The measurement of the front-back asymmetry is made difficult by the uncertain efficiency of observing the Λ decays, due either to the smallness of decay-particle ranges or to the small angles between them. In order to reduce these uncertainties to a minimum, we used only cases of pair creation (106 cases), which were selected most carefully.[5] Upon correcting for the foregoing uncertainties we found the fraction of the protons emitted backward in the Λ-particle c.m.s. to be 0.53 ± 0.08. This is in good agreement with the value 0.5, expected if parity is conserved during the process of creation of the Λ particle.

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