$[k(2\omega) - 2k(\omega)]/\rho_\Sigma$ are $\sim 10 - 15$, and a similar conclusion is reached by the authors of [9], who considered the case of linear polarization of the fundamental radiation), the spatial dispersion can greatly alter the character of the excitation of the anti-Stokes components of stimulated Raman scattering (SRS). Indeed, the spatial dispersion is able in this case tc compensate fully relatively small wave deviations $\Delta k = 2k_\ell - k_S - k_a$ ($\rho_\Sigma = 2\rho(\omega_\ell) + \rho(\omega_S) + \rho(\omega_a)$ for the waves of the appropriate polarizations). A possibility thus arises of effectively exciting anti-Stokes components in optically active media in the laser-beam direction; this can strongly alter the SRS picture and greatly increase the intensity of the anti-Stokes components. Such a compensation can be used in similar fashion in other interactions, too; it is most effective for interactions with small Δk, especially for four-photon parametric amplification.

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POSSIBLE NATURE OF CP-NONINVARIANCE OF WEAK INTERACTIONS

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Wolfenstein proposed in one of his papers [1] that CP-parity violation is due to the fact that the constant for the interaction between the hadron current, $\Delta S = 1$, with the leptons is imaginary. The constants of other types of weak interaction are real.

According to Wolfenstein, CP-noninvariance in nonlepton process would result, as an effect of second order in G, from diagrams of the type shown in Fig. 1, and could be appreciable, since the integral with respect to the relative momentum of the leptons $(p_e - p_\nu)$ is not cut off by strong interactions.

The lepton loop relates hadron currents in the form

$$[\delta_{\alpha\beta}(\Lambda^2\phi_1 + k^2\phi_2) + k_\alpha k_\beta \phi_3]\, j_\alpha(\Delta S = \Delta Q = \pm 1)\, j_\beta(\Delta S = 0, \Delta Q = \mp 1),$$

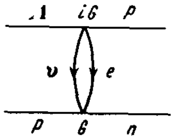

Fig. 1

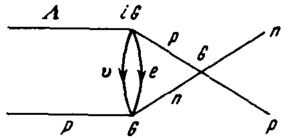

Fig. 2

where Λ is the cutoff due to <u>weak</u> interactions, $k = p_e + p_\nu$ and ϕ_i are definite logarithmic functions of Λ^2 and k^2.

However, Zel'dovich and Okun' [2] raised an objection to [1], arguing that in the theory with charged currents the term $\delta_{\alpha\beta}\Lambda^2$ does not lead to CP-parity violation effects, and the term proportional to $k_\alpha k_\beta$ produces too small an effect if the momenta of the virtual hadrons are cut off by the strong interactions at a value on the order of the nucleon mass m_N.

We shall show in this note, on the basis of current algebra, that strong interactions do not cut off the virtual hadron momenta in the third-order processes in G described by diagrams such as Fig. 2, and that the term $k_\alpha k_\beta$ leads, within the framework of the hypothesis of [1], to CP-parity violation of the order of $G^2\Lambda^4$.

Let us consider the theory with charged weak currents. If A and B are the initial and final states of the hadrons, then the matrix element of order G^3, which includes the lepton loop, is represented in the form

$$M \sim i G^3 \int \frac{d^4 k}{(2\pi)^4} [\delta_{\alpha\beta}(\Lambda^2\phi_1 + k^2\phi_2) + k_\alpha k_\beta \phi_3] M_{\alpha\beta}(k_1 q_A, q_B),$$

where

$$(2\pi)^4 M_{\alpha\beta}(k, q_A, q_B)\,\delta^4(q_A - q_B) = i\int e^{ik(x-y)} d^4x\, d^4y \langle B/T\{i^+_\alpha(x), i^-_\beta(y), i^+_\sigma(o), i^-_\sigma(o)\}|A\rangle.$$

Using commutation relations between the currents in the form given in [3] and neglecting the divergence of the axial current at large momenta, we get:

$$\frac{1}{4} k_\alpha k_\beta M_{\alpha\beta}(k, q_A, q_B) = \langle B|i^-_\sigma(o)i^+_\sigma(o) + i^3_\sigma(o)i^3_\sigma(o)|A\rangle.$$

It follows therefore that

$$M \sim \frac{iG^3\Lambda^4}{(2\pi)^4} \langle B|i^-_\sigma(o)i^+_\sigma(o) + i^3_\sigma(o)i^3_\sigma(o)|A\rangle.$$

Starting from the theory with charged currents, we obtained the interaction of neutral currents. This means that the obtained effect does not reduce to a change of phase in the interaction constant, and should lead to a CP-parity violation which in general is of the order of $G^2\Lambda^4/(2\pi)^4$.

Ioffe and the author [4] have shown that the experimental limits of the neutral currents lead to small values $G^3\Lambda^4/(2\pi)^4$. In particular, it follows from the absence of $K^+ \to \pi^+ + e^+ + e^-$ decays [5] that $G^2\Lambda^4/(2\pi)^4 < 5 \times 10^{-6}$. Then the only process in which the CP-parity violation can be of the order of 10^{-3} is $K_2^0 \to 2\pi$, the violation taking place in the mass operator of the (K_1, K_2) system.*

Indeed, the CP-even part in the mass operator is of the order of $G^2 m_N^4/(2\pi)^4$. The contribution of the considered CP-odd interaction is of the order of $G^3 m_N^2/(2\pi)^6$. Consequently the effect of CP-noninvariance in the mass operator is of the order of $G\Lambda^2/(2\pi)^2 \cdot \Lambda^2/m_N^2$, which amounts to $\sim 10^{-3}$ when $\Lambda \sim 10$ GeV.

The foregoing CP-parity violation mechanism does not explain the preliminary data on the relative probability of the decays $K_2^0 \to 2\pi^0$ and $K_2^0 \to \pi^+ + \pi^-$ [6]. Its results coincide with those of superweak interaction [7], i.e., it leads to a noticeable effect of CP-parity violation only in $K_2^0 \to 2\pi$ decays.

It is obvious that the proposed mechanism for CP-noninvariance in $K_2^0 \to 2\pi$ decays takes place in the fully CP-odd theory of weak interaction [8]. The latter, however, leads to many consequences which do not arise in the case of superweak interaction.

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*Another such effect is the suppression of the $K_2^0 \to \mu^+ + \mu^-$ decay amplitude by a factor 10^3 compared with the $K_1^0 \to \mu^+ + \mu^-$ decay amplitude.

INTERBAND TRANSITIONS IN METALS, DUE TO BRAGG REFLECTION OF ELECTRONS

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In our earlier paper [1] we related the singularities in the variation of the interband conductivity σ in the infrared and visible parts of the spectrum with the Fourier components of the pseudopotential V_g. The positions of the maxima of σ were used to calculate V_{111} and V_{200}, the two fundamental Fourier components of the pseudopotential of indium. Similar considerations were advanced also in a theoretical paper by Harrison [2].

In this paper we consider interband transitions connected with Bragg splitting, and derive a method for determining the Fourier components of the pseudopotential from optical measurements.

The results of this study show that the fundamental structure of σ is determined in the indicated spectral region by the Bragg reflection of the electrons, and not by transitions connected with high-symmetry points, as is the case in semiconductors.

We have calculated the interband conductivity σ under the following assumptions: the wave function of the electrons is taken to be a sum of two plane waves; the electron energy