The corrections may amount to several hundredths ev. In the case of lanthanum, for example, where the atomic and ionic energy level diagrams are known, the correction for the above temperature interval amounts to 0.04 ev. Thus our values of the ionization potentials for atoms of neodymium and praseodymium, not taking into account the possibility of excited atomic and ionic states near the ground state, turned out to be:

$$V_{\mathrm{Pr}} = 5.79 - 0.09 - 0.22 = (5.48 \pm 0.01) \text{ ev},$$

$$V_{\mathrm{Nd}} = 5.79 - 0.09 - 0.19 = (5.51 \pm 0.02) \text{ ev}.$$

We would like to remark in conclusion that our results might be viewed as experimental confirmation of the validity of the theoretical equations[3] for the surface ionization of indium, neodymium and praseodymium atoms on incandescent tungsten.

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THE LINE SHAPE OF THE NUCLEAR ACOUSTIC RESONANCE

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RECENTLY there appeared in the literature a number of articles on nuclear acoustic resonance in which the line shape $A(\omega)$ of the nuclear acoustic resonance absorption and the relaxation process in acoustically-excited spin systems is interpreted on the basis of the existing theory of nuclear magnetic resonance (cf. references 1 and 2).

Our investigation of the character of the interaction of the ultrasonic field with the nuclear spin system in cubic crystals, based on the quantum theory of irreversible processes,[3] shows that the above-mentioned method of interpretation of acoustic magnetic resonance data is unfounded and leads to erroneous conclusions. While the line shape of ordinary paramagnetic resonance is determined by the Fourier transform of the auto-correlation function $G_M(t)$ of the magnetic moment M of the spin system,[3] the line shape of the acoustic nuclear resonance is analogously determined by means of the auto-correlation function $G_K(t)$ of the nuclear quadrupole moment K_0 of the spin system. Since M and K_0 are described by a linear and bilinear function of the spin variables, respectively, the character of the time variation of M and K_0 differs for dipole-dipole ($\mathcal{H}_d$), exchange ($\mathcal{H}_{ex}$), and other inner interactions, and the functions $G_M(t)$ and $G_K(t)$ do not coincide.

In particular, in the case when the longitudinal sound wave propagates along the [110] axis and a strong static magnetic field H parallel to the z axis forms an angle θ with the [110] axis, we obtained

$$A(\omega) = \sum_a \omega^2 \frac{\langle |K(\omega_a)|^2 \rangle}{VkT} \left(1 - \sum_{\omega_\gamma \neq 0} \frac{\Delta^2_{a\gamma}}{\omega^2_\gamma}\right) (2\pi\Delta^2_{a0})^{-1/2}$$
$$\times \exp\left\{-\frac{1}{2\Delta^2_{a0}}\left(\omega - \omega_a + \sum_\gamma \frac{\Delta^2_{a\gamma}}{\omega_\gamma}\right)^2\right\}, \qquad (1)$$

where the coefficients for the transition $a = \xi$, in the course of which the magnetic quantum number m of nuclei with spin I changes by ± 2, are calculated according to the formula

$$K(\omega_\xi) = \frac{K_0}{4I(2I-1)}\left[\frac{3}{4} + \frac{S_{44}}{S_{11}} + \left(\frac{S_{44}}{S_{11}} - \frac{3}{4}\right)\sin^2\theta\right] S_{11}\varepsilon_1 \sum_j [I_x^{j2} - I_y^{j2}],$$

$$\Delta^2_{\xi 0} = \frac{1}{6} I(I+1) \sum_{k(\neq j)} \{(P^{jk}_{xx} + P^{jk}_{yy})^2 + 8P^{jk^2}_{zz}\},$$

$$\mathcal{H}_{\mathrm{d}} + \mathcal{H}_{\mathrm{ex}} = \sum_{j>k} \sum_{\alpha,\beta} P^{jk}_{\alpha\beta} I^j_\alpha I^k_\beta,$$

$$\Delta^2_{\xi 1} = \frac{5}{3} I(I+1) \sum_{k(\neq j)} (P^{jk2}_{xz} + P^{jk2}_{yz}),$$

$$\Delta^2_{\xi 2} = \frac{1}{6} I(I+1) \sum_{k(\neq j)} \{(P^{jk}_{xx} - P^{jk}_{yy})^2 + 4P^{jk2}_{xy}\}.$$

Here ϵ_1 is the mean value of the time-dependent component of the deformation tensor ϵ; $S_{\eta\eta}$ are the components of the fourth-rank tensor relating ϵ with the tensor of the electric field gradient on the nucleus [see (1), (2), and (14) in reference 4]; $\Delta^2_{\xi 0}$ is the adiabatic second moment of the resonance line, $\Delta^2_{\xi 1}$ and $\Delta^2_{\xi 2}$ are the non-adiabatic second moments for transitions with m changing by ± 1 and ± 2, respectively (cf. reference 5), and ω_1 and ω_2 are the corresponding transition frequencies; V is the volume of the crystal, k the Boltzmann constant, and T the temperature. The form of the components of the tensor $P^{jk}_{\alpha\beta}$ is indicated in reference 6.

According to (1), the absorption curve $A(\omega)$ consists of a series of $(a = \xi, \ldots.)$ Gaussian lines, shifted by a distance $\Sigma_\gamma \Delta^2_{\alpha\gamma}/\omega_\gamma$ from the resonance frequencies ω_a. The width of these lines (at half the intensity) is calculated from the expression $\Delta\nu_{1/2} = 2.35\,\Delta_{a0}$. The coefficient $\Delta^2_{\epsilon 0}$ differs from the corresponding result $\langle(\Delta\nu)^2\rangle$ of Van Vleck[5] in that $\Delta^2_{\epsilon 0d}$ for the $\mathcal{H}_d$ interaction is twice $\langle(\Delta\nu)^2\rangle_d$, and $\Delta^2_{\epsilon 0}$ depends on the value of the isotropic exchange interactions. Therefore, the acoustic magnetic resonance is a much-promising method of investigation of exchange interactions in crystals.

Furthermore, it follows from our calculations that if $\Delta\nu_{1/2}$ in a crystal is determined by dislocation-type defects, then for $I = 3/2$ and $I = 5/2$ the ratio δ of the ultrasonic resonance width and the magnetic resonance width are respectively $\delta(3/2) = \sqrt{5/3}$, and $\delta(5/2) = \sqrt{12/5}$. The experimental values are $\delta(3/2) = 1.7$ (reference 1) and $\delta(5/2) > \delta(3/2)$ (reference 2).

We note that in the event of the excitation of free nuclear precession about the direction of H by an ultrasonic moment, the form of the decrease in the nuclear induction signal G with time will be described by the function $G_K(t)$ obtained from $A(\omega)$ by a Fourier transform [cf. reference 3, (3.17)]. Since $G_K(t) \neq G_M(t)$, it follows that ultrasonic moment methods can yield new results compared with the usual spin-echo method.

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BETA AND GAMMA SPECTRA OF THE Sb^{113} AND Sb^{115} ISOTOPES

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RECENTLY Selinov and his co-workers[1] discovered the new antimony isotopes Sb^{113} and Sb^{115}. The isotopes were obtained by the method of absorption of the approximate values of their end-point beta spectra.

The beta and gamma spectra of these isotopes were investigated with a double-lens beta spectrometer. The positron spectrum of Sb^{113} was found to consist of two components with end-point energies of 1.85 ± 0.02 and 2.42 ± 0.02 Mev. The values of log ft are 4.4 and 4.7. The end-point energy of the positron spectrum of Sb^{115} is 1.51 ± 0.02 Mev, and log ft = 4.25. The shape of the spectra is resolved. In the conversion-electron spectrum of Sb^{115} a gamma line with an energy of 0.499 ± 0.002 Mev was found. The conversion coefficient α_K is 0.00625. The ratio of the conversion coefficients of the K and L shells is about 6. According to preliminary data, eight gamma lines were observed in the Sb^{113} gamma spectrum, which was investigated with a scintillation spectrometer. The data on the Sb^{113} gamma spectrum are being published in the transactions of the 10th Conference on Nuclear Spectroscopy.

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A ROTATORY MAGNETO-MECHANICAL EFFECT IN A LOW PRESSURE PLASMA

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IT has been pointed out in the literature[1] that in a low pressure positive column the gas should rotate around the axis of the column if a longitudinal