P(γ) calculated for k = 1 (curve 2). It is easy to see that the use of the "two-thirds" law, which does not take into account the bounded character of the emission surface, gives an electron current that is smaller by 1 - 2 orders of magnitude (k(γ) - curve 3).

It follows from Fig. 3a that an appreciable increase of the perveance of the electron beam can be attained by first filling the gap partially with the plasma of the CF. This can be done by applying two voltage pulses with a certain pause between them. Application of the first short pulse produces the CF, and the second is the working pulse. The results of one of the experiments with two pulses of 5 nsec duration are shown in Fig. 3b. Although the amplitudes of both voltage pulses are approximately equal (U_0 = 30 kV), the amplitude of the electron current is 4 times larger for the second pulse (∿85 A). The maximum attained current ratio was 8.

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INFLUENCE OF SUPERCONDUCTING TRANSITION ON THE INTERNAL FRICTION OF TANTALUM

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We have studied low-frequency internal friction of tantalum, using samples in the form of thin foils measuring 0.1 × 2 × 10 mm. The measurement of the internal friction (Q^{-1}) was based on a procedure developed in [1] and modified because the investigated sample was placed in a helium cryostat. The sample was cantilever-mounted on a holder, and the free damped flexural oscillations produced after excitation were registered. The oscillation frequency could be varied from 50 to 2000 Hz and the relative deformation was $\varepsilon = (2 - 3) \times 10^{-6}$. The relative error in the measurement of the internal friction at helium temperatures did not exceed 0.5%. The temperature was measured with manometric and capacitive [2] thermometers accurate to 0.02°K.

Figure 1 (curve 1) shows a plot of Q^{-1} obtained with a sample annealed at 1500°C for 0.5 hours in a vacuum of 2×10^{-5} Torr. A very sharp and tall maximum was observed at the temperature of the transition to the superconducting state. The width of the maximum at the base did not exceed 0.25°K.[1)]. The temperature of the maximum does not change when the sample oscillation frequency is altered. In order to ascertain tentatively the nature of the maximum observed by us, we measured the internal friction in a magnetic field

[1)] There were many similar investigations of Q^{-1} (see the review [3]), but the peak was never observed, apparently as a result of the insufficient accuracy of temperature measurements and as a result of the use of bulky samples.

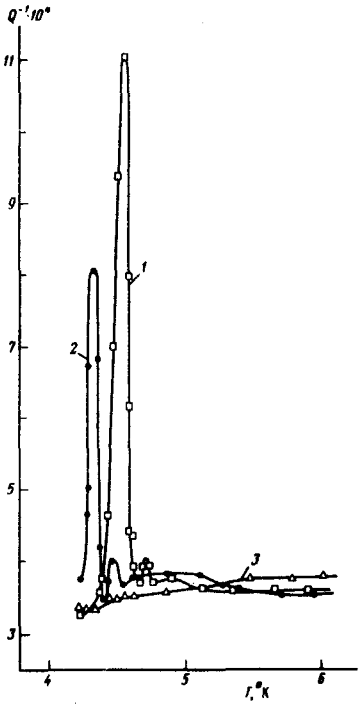

Fig. 1

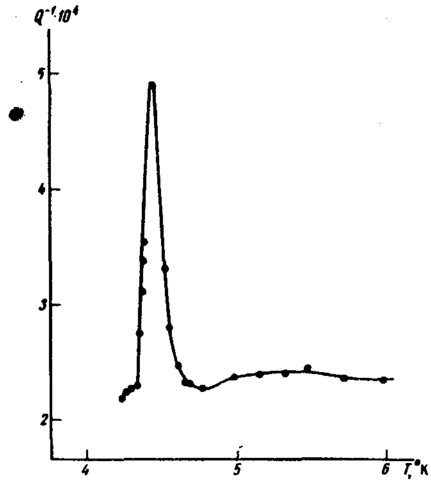

Fig. 2

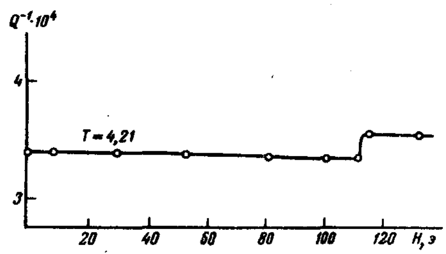

Fig. 3

$H < H_c$ directed perpendicular to the plane of the sample. In this case a maximum of Q^{-1} with somewhat smaller height was registered at the critical temperature corresponding to the applied magnetic field (curve 2 of Fig. 1). When a magnetic field $H > H_c$ is applied, the superconductivity of the sample is destroyed, and the maximum of Q^{-1} vanishes (curve 3). Plastic deformation (rolling) by 94.5% (Fig. 2) does not change the temperature corresponding to the maximum of Q^{-1}. All that is observed is a slight broadening of the maximum.

To verify the influence of the magnetic field on $Q^{-1}(T)$ of tantalum in the superconducting and in the normal states, measurements were made in an isothermal regime. As seen from the curve of Fig. 3, the magnetic field $H < H_c$ at $T < T_c$ does not change the level of the internal friction. On the other hand, if the external magnetic field H reaches values larger than H_c and the sample goes over into the normal state, then a jump of the internal friction is observed. The closer the isotherm temperature T to T_c of tantalum, the larger the jump.

From the condition for the occurrence of an internal-friction maximum, $\omega\tau = 1$, where $\omega = 2\pi f$ (f is the sample oscillation frequency), we determine the relaxation time τ of the process responsible for the appearance of the maximum of Q^{-1} in tantalum. At f = 940 Hz we have $\tau \simeq 1.7 \times 10^{-4}$ sec. We can therefore conclude that the observed maximum is not connected with electronic excitations whose relaxation time lies in the range 10^{-6} - 10^{-7} sec (cf., e.g., [3]). The available experimental data still do not allow us to draw an unambiguous conclusion concerning the mechanism responsible for the formation of the $Q^{-1}(T)$ peak observed by us.

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MOSSBAUER SPECTRA AND THE JAHN-TELLER PSEUDOEFFECT IN M_2SbCl_6

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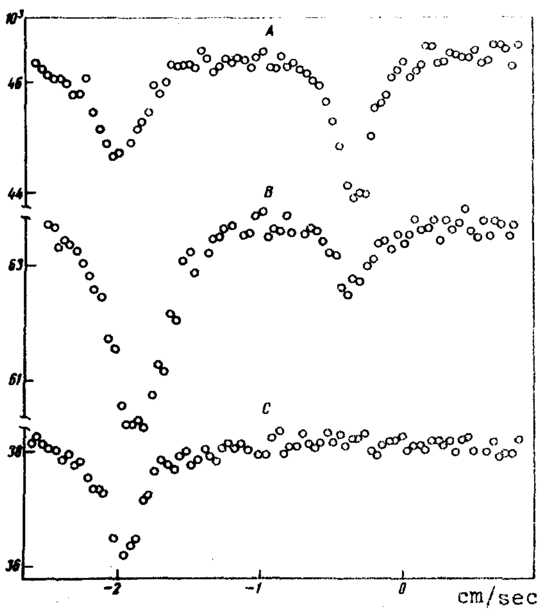
The purpose of the present investigation was to show, first, that crystals with a gross composition M_2SbCl_6 (M = NH_4, Rb, Cs) [1] contain two different antimony ions, Sb^{3+} and Sb^{5+}, and second, to show that in these crystals the diamagnetic octahedra $SbCl^{4-}$ are distorted in the manner observed in the isoelectronic XeF_6 [2] and $CsIF_6$ [3].

To prove this, we plotted the Mossbauer spectra for the cases M = Rb and Cs at 77°K (the absorbers contained 10 mg/cm^2 of Sb), using a $^{121m}SnO_2$ source (at T = 300°K), with a line width Γ = 2.7 mm/sec. The spectra of their parameters are given in the figure and in the table.

Compound	Sb^{5+} Measured shift, mm/sec	Sb^{5+} Line width, mm/sec	Sb^{3+} Measured shift, mm/sec	Sb^{3+} Line width, mm/sec
A. Rb_2SbCl_6	– 3.0 + 0.2	2.8 + 0.3	– 19.3 + 0.3	3.95 + 0.3
B. Cs_2SbCl_6	– 3.0 + 0.2	2.8 + 0.3	– 18.5 + 0.4	4.3 + 0.3
C. $Rh(NH_3)_6Sb^{III}Cl_6$	–	–	– 19.3 + 0.3	2.8 + 0.2



An analysis of the spectrum leads to the following main results:

1. In the spectra of A and B there are two resonant-absorption maxima whose parameters correspond [4, 5] to Sb^{3+} and Sb^{5+}.

2. The Sb^{5+} absorption line in Cs_2SbCl_6 has a relatively low intensity (spectrum of B), and the summary intensity of the absorption lines of Sb^{5+} and Sb^{3+} is approximately the same in spectra of A and B.

The relatively low intensity of the absorption line is obviously connected with the appreciable amplitude of the oscillations of antimony in the form of Sb^{5+} in the octahedral complex, a possible result of the dynamic Jahn-Teller pseudoeffect.

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