A comparison shows that the experimental data are in satisfactory agreement with the results of the theoretical analysis.

The authors are grateful to I. L. Bershtein, under whose guidance the work was performed.

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* The authors are grateful to L. A. Khurtin for help in constructing the radio apparatus.

** Frequency fluctuations due to noise of the gas discharge were observed in the frequency band up to 100 - 150 kHz. This effect was eliminated by proper choice of the discharge conditions.

*** We note that in some cases narrow peaks were observed in the values of $w_\nu(F)$, corresponding to mechanical resonances of the laser system; they were eliminated by taking appropriate measures.

RADIO-FREQUENCY SIZE EFFECT IN MOLYBDENUM

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ZhETF Pis'ma 6, No. 7, 737-741 (1 October 1967)

The progress made in recent years in the production of pure transition metals (Cr, W, Mo) have made it possible to perform a number of experiments [1-4] on the Fermi surfaces of these metals.

Comparison of the experimental data with the Fermi-surface model proposed by Lomer [5,6] for metals of the chromium group yielded good agreement.

It must be noted, however, that the comparison was only semiquantitative [4]. The method proposed by Gantmakher [7]for the investigation of the electron spectrum of metals - the size-effect method - greatly expanded the experimental possibilities of investigating Fermi surfaces and has made possible a more detailed com parison with the existing theoretical models.

However, owing to the regired high purity of the investigated materials ($l > d$), such measurements were made with a very small group of metals [7-10].

We present here results obtained by observing the size effect in molybdenum.

The molybdenum samples investigated had a resistance ratio $R_{300°K}/R_{4.2°K}$ = 12 000 and were in the form of discs 6 mm in diameter and 0.142 mm thick. They were placed in the coil of the generator tank circuit and were cooled together with the coil to helium temperatures. The experiment consisted of measuring $\partial R/\partial H$ as a function of H.

Since the intensities of the size-effect lines depend on the electric-field polarization, the apparatus was operated at maximum sensitivity in all the experiments by making E perpendicular to the constant magnetic field H.

The angle between the magnetic field and the crystallographic axes of the sample was varied by rotating the sample. A sample plot of $\partial R/\partial H$ vs. H is shown in Fig. 1. The arrows in this figure mark the value of the field H_0 used to calculate the electron momenta [8,11].

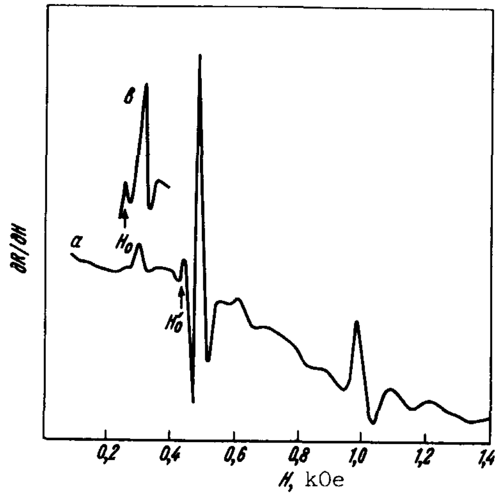

Fig. 1. Plot of $\partial R/\partial H$ vs. H. Generation frequency 3.8 MHz. Temperature 1.8°K. Constant magnetic field perpendicular to [111]. Curve "b" is drawn with an ordinate scale increased by ten times.

Figure 2 shows the central section of the Fermi surface, corresponding to the last Lomer model [6], in the plane perpendicular to the [110] axis.

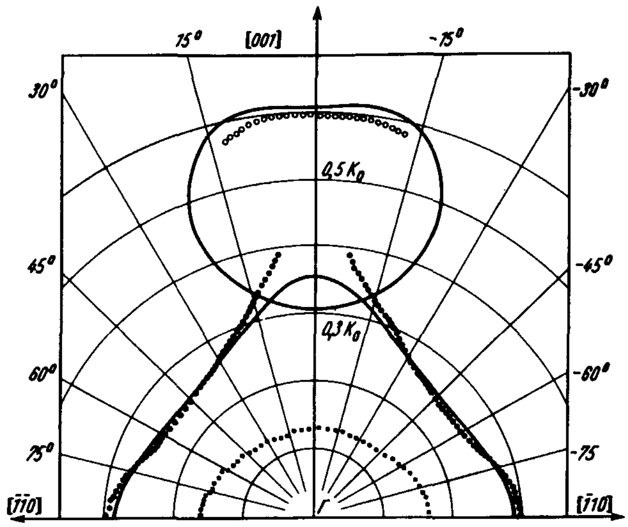

Fig. 2. Intersection of the electronic Fermi surface of molybdenum and the plane perpendicular to the [110] axis. Solid curve - Lomer's model. •, ■, o - experimental points corresponding to the halfwidths of the extremal orbits on the octahedron, on the spheroids located at the ends of the octahedron, and on the total electron model with center at the point Γ, respectively.

The points denote the values of k/k_0 obtained from our experiment. The distance $\Gamma H = k_0$ was chosen equal to $2\pi/a = 1.99$ Å^{-1}, where a is the lattice constant. The experimentally observed sections of the hole Fermi surfaces have not been considered as yet.

Quantitative estimates of the dimensions of the electronic Fermi surface of molybdenum, and a comparison with the results by others, are listed in the table.

We estimate the error in our measurements at ±5%. For the crystallographic directions of the sample, where the size-effect line had a clearly pronounced character, this error was half as large.

As seen from Fig. 2 and from the table, the experiments and the predicted model of electronic octahedron [6] at the point Γ agree quite well with the results of other workers.

The difference increases for the spheroids located at the ends of the octahedron.

Table

Direction	Lax model	Lomer model	Present results	Results by other methods
[100]	0.608	0.602	0.592	0.603 [4]
[111]	0.232	0.250	0.244	0.265 [3]
[110]	0.257	0.284	0.296	

It must be noted that the model proposed by Lax for the Fermi surface of molybdenum is in somewhat poorer agreement with our experimental results.

We consider it our pleasant duty to thank V. P. Naberezhnykh for valuable advice and discussion, to L. N. Aleksandrov for help in constructing the experimental setup, and G. P. Kovtun for supplying the pure molybdenum.

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EFFECT OF ROTATION ON THE DENSITY OF He II

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ZhETF Pis'ma 6, No. 7, 741-743 (1 October 1967)

Andronikashvili and Tsakadze [1-4] reported observation of condensation of rotating He II and a jump in its density on going through T_λ while in the rotating state. Since this result greatly affects the answer to the question of the nature of the phase transition in rotating helium, we deemed it advisable to repeat these experiments under conditions of a precisely stabilized and controlled temperature, and using a more sensitive pycnometer.

The pycnometer * used in the present work consisted of a small copper bulb of 21.1 cm^3 volume soldered to a glass capillary 0.056 cm in diameter and 20 cm long. The helium was admitted into the pycnometer through a thin-wall capillary of stainless steel, of 1 mm diameter, which was disconnected from the inlet system during the rotation by means of a valve located outside the dewar. The volume occupied by the gas phase was 0.5 cm^3. The pycnometer was rotated by an electric motor equipped with a reduction gear specially developed for this purpose, which made it possible to vary the speed of rotation continuously from 0 to 32 sec^{-1}, the angular velocity being kept constant within 0.3%. The accuracy with which the He II level in the capillary could be read with a KM-6 cathetometer was 0.02 mm at standstill and 0.05 mm during rotation, making it possible to register a relative density change equal to 5×10^{-7}.

In view of the importance of temperature stability in the change of the helium density,