We now calculate the expression for the heat capacity of the superconductors in the cases under consideration. As a result we obtain the following expression for the ellipsoid:

When $T = T_c$

$$\frac{C_s(T_c)}{C_n(T_c)} = 2{,}4 + 1{,}4\frac{b+c}{a}\left(\frac{\Delta m}{m_1}\right)^2. \qquad (8)$$

In the low-temperature region we obtain

$$\frac{C_s(T)}{C_n(T_c)} = \frac{1}{\pi^2 T_c}\left(\frac{\pi}{2}\right)^{1/2} T^{-3/2}\Delta^{5/2}(0)\exp\left(\frac{-\Delta(0)+\beta}{T}\right)\sqrt{\frac{\pi T}{2\beta}},$$

$$\Delta(0) = \overline{\Delta(\vartheta)}, \qquad \beta = \frac{b+c}{a}\left(\frac{\Delta m}{m_1}\right)^2\Delta(0). \qquad (9)$$

The formula is applicable at temperatures that satisfy the condition

$$T/\Delta(0) \ll (\Delta m/m_1)^2(b+c)/a.$$

Analogous results are obtained also for a cylinder. However, in the absence of a small parameter similar to $\Delta m/m$ (both for an ellipsoid and for a cylinder), the variation of the gap and of the heat capacity near T_c may be more complicated.

It is easy to see that as $T \to 0$ the heat capacity C_s is determined by the smallest gap Δ_{min} (see also reference 4); on the other hand, near T_c it is determined by the average value of the gap $\Delta(0)$. Therefore C_s diminishes in the anisotropic model more slowly with decreasing temperature than in the isotropic model. This agrees with the experimental data (see references 4 and 5). Since the expression for C_s (and obviously also for the critical magnetic field H_c) contains the parameters of the Fermi surface (m_1 and m_2 for an ellipsoid, $k_{\perp F}$ and $k_{z\,max}$ for a cylinder), C_s and H_c are no longer universal functions of the temperature, as in the isotropic model, and this explains the difference between the experimental curves of C_s and H_c for different superconductors.

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MEASUREMENT OF ANGULAR DISTRIBUTIONS IN THE REACTION $Al^{27}(p, p')Al^{27}$ *AT 616 Mev WITH A MAGNETIC ANALYZER*

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It is well known that the study of angular distributions in inelastic proton scattering is an important source of information about the properties of nuclear states and the mechanism of inelastic scattering. In such investigations, it is necessary to measure angular distributions of groups of particles with nearly the same energy; this can be done quite reliably by magnetic analysis. On the other hand, the use of a magnetic analyzer leads to a significant increase in the difficulty of the experiment. Therefore, in the overwhelming majority of experiments, the angular distributions are measured with scintillation spectrometers, nuclear emulsions, etc.[1] Because of their low resolution, and because of overloading due to elastic protons, these techniques can measure angular distributions only for one or two excited states of the nucleus.

The ease of field measurement[3] and regulation and the relatively high intensity of the magnetic analyzer described previously[2] enabled us to measure angular distributions for the six groups of elastic and inelastic protons from Al^{27} leading to the excited states at 0.840, 1.014, 2.216, 2.743, and 3.000 Mev (the last level is, according to reference 4, a doublet: 2.976 and 2.999 Mev) without excessive increase in the difficulty of the experiment.

The protons were accelerated in the 120-cm cyclotron of the Moscow State University. A monochromatic beam was obtained by placing collimating slits after the focusing magnet. The full energy spread of the beam was about 45 kev.

The spectrometer for analyzing the secondary particles was set on a rotating support. The particle detector was a ZnS scintillation counter with an FÉU-29 photomultiplier.

The measured differential cross sections (in mb/sr) for elastic and inelastic proton scattering on Al^{27} at 6.6 Mev are shown in the table. The accuracy of the cross sections is about 10%.

Q, Mev	Scattering angle in lab system									l	R, f
	32°49′	48°28′	63°04′	76°54′	90°24′	109°10′	124°13′	138°17′	151°57′		
0.000	850.20	302.30	177.00	109.20	60.50	38.50	44.50	65.00	64 20	—	—
—0.840	4.75	7.87	7.85	7.47	6.55	4.35	—	2.52	2.0	2	5.6
—1.014	6.93	9.55	10.30	10.10	8.88	7.80	7.00	6.34	—	2	5.6
—2.216	10.40	12.95	14.30	16.00	17.70	15.35	10.60	9.75	8.15	3	5.6
—2.743	8.45	11.20	12.55	13.35	13.05	12.30	11.60	10.50	7.36	2	5.0
—3.000	12.20	14.60	17.80	19.90	20.50	16.70	14.05	10.20	9.75	2	5.0

The angular distributions of all the particle groups (in the center-of-mass system) have the characteristic features peculiar to direct interaction angular distributions. The total scattering cross section for the six levels is about 700 mb, which is larger than the cross section for compound nucleus formation (about 600 mb). This leads to the conclusion that direct interaction makes a substantial contribution in 6.6-Mev scattering. The orbital angular momenta, l, transferred to the nucleus, determined by comparison with direct interaction theory,[5] are given in the table together with the corresponding values of the interaction radius R (in 10^{-13} cm).

In conclusion, the authors express their gratitude to Z. F. Kalacheva, I. V. Kretov, G. S. Tyurikov, N. S. Kirpichev, and M. Kh. Listov for aid in this work, and also to the crew of the cyclotron, particularly Yu. A. Vorob'ev, A. A. Danilov, V. P. Khlapov, and E. Kir'yanov, for assuring proper operation of the accelerator.

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A METHOD FOR THE MEASUREMENT OF PHOTOPRODUCTION OF π^+ MESONS ON HYDROGEN CLOSE TO THRESHOLD

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WHEN combining the experimental data on the photoproduction of π^+ mesons close to threshold[1] one finds that the square of the matrix element increases as the photon energy decreases. However, very close to threshold the accuracy of the measurements is not good enough to draw definite conclusions.[2]

The absence of good data on the photoproduction cross section close to threshold is due to the large experimental difficulties. Very close to threshold (152 – 160 Mev) one cannot use liquid or gas targets because of the energy loss of the mesons in the target and because of the large background. In this energy region one has to use thin polyethylene targets.[3] However, one then has to perform $CH_2 - C$ difference experiments, which for large yields from carbon decreases the statistical accuracy of the results.

We shall describe a method which allows to circumvent these difficulties and we shall give results of an experimental demonstration of its feasibility. The method is based on the kinematical difference between photoproduction on hydrogen and on carbon, in particular on the difference in the thresholds. The following reactions have the lowest thresholds:

$$\gamma + {}_6C^{12} \rightarrow \pi^+ + {}_5B^{12}, \qquad (1)$$

$$\gamma + {}_6C^{12} \rightarrow \pi^+ + n + {}_5B^{11} \qquad (2)$$

$$\gamma + {}_6C^{12} \rightarrow \pi^+ + n + n + {}_5B^{10}. \qquad (3)$$

The thresholds for these reactions are respectively