cusps (cf. reference 2), and these should be found experimentally. In the first two cases the singularity can be interpreted unambiguously. If, however, the singularity is of the "peak" type then it may easily be mistaken for a resonance. In that case the fact that the peak should, generally speaking, be rather narrow (of the order of 10 — 20 Mev) may help to identify it. This last circumstance makes the possibility unlikely that the observed maxima for $T = 1/2$ for π mesons of energies 680 and 940 Mev (private communication from D. Frish) could be due to the production of the ρ^0 meson ("ρ^0-mass" — 1200 and 1520 electron masses). Another method for distinguishing resonance and threshold singularities may be based on a comparison of interactions in systems with the same energy but different isotopic spin. Thus, for example, if the singularities in $\pi^- p$ scattering at 680 and 940 Mev are threshold singularities then corresponding singularities should appear in $K^- p$ scattering at K-meson energies of 520 and 810 Mev (in the $T = 0$ state).

A study of the magnitude of the singularity would permit an estimate of the upper limit for the possible production cross section of the ρ^0 meson. To this end it is convenient to make use of the quantity

$$2\left(\frac{\delta\sigma(\varepsilon)}{\sigma(\varepsilon)}\right)^2 = \left(\frac{\sigma(E_0+\varepsilon)-\sigma_{\text{thr}}}{\sigma_{\text{thr}}}\right)^2 + \left(\frac{\sigma(E_0-\varepsilon)-\sigma_{\text{thr}}}{\sigma_{\text{thr}}}\right)^2,$$

where E is the threshold energy and is the elastic cross section. It is easy to show that

$$\delta\sigma(\varepsilon)/\sigma(\varepsilon) = (k/4\pi)\,\sigma_\rho(\varepsilon)/\sqrt{\sigma(\varepsilon)}.$$

Here k is the π-meson wave vector and σ_ρ is the ρ^0 production cross section at a π-meson energy $E + \epsilon$.

In conclusion we note that the same idea was proposed independently by Pontecorvo et al.[7] to whom we are grateful for useful discussions.

*If the threshold for ρ^0 production were to correspond to a π-meson energy of less than 270 Mev then the relatively fast decay $K^+ \to \pi^+ + \rho^0$ ($\Delta T = 1/2$) would be possible, which however, has not been observed.

†This is connected with the fact that the scattering phase shift δ_0 becomes complex above threshold (near threshold): $\delta_0 = \delta_{01} + i\delta_{02}$, with δ_{01} an even function of k (the ρ^0 wave vector) and δ_{02} an odd function. Hence below threshold δ_{02} is imaginary and therefore δ_0 is real.

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ANISOTROPY OF THE ABSORPTION COEFFICIENTS OF ULTRASONICS IN SUPERCONDUCTORS

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It is known that both the energy gap at $T = 0$ and the temperature dependence of the gap width (ϵ_0) can be determined from measurements of ultrasonic attenuation in superconductors.[1] The agreement between experiment and theory is satisfactory.

There have also been determinations of the effect of isotopic constitution[2] and of unidirectional lattice deformation[3] on T_k, and consequently on the gap width too. One might expect anisotropy of the lattice to have a greater influence than isotopic constitution.

In this note we report the results of an experimental determination of the attenuation of 70-Mcs ultrasound in the superconducting and normal states. The arrangement was such that at each temperature the absorption coefficient could be measured along the twofold (C_2) and the fourfold (C_4) axes for a spherical tin specimen.

The results are shown in the table, and also the values of ϵ_0 calculated from them according to the Bardeen, Cooper, and Schrieffer theory.[4] It can be seen that the temperature dependence of the ratio of absorption coefficients, α_s/α_n, is different in the two directions. Better agreement

Temperature	α_s/α_n Along C_4	ε_0/kT_k Along C_4	α_s/α_n Along C_2	ε_0/kT_k Along C_2	Temperature	α_s/α_n Along C_4	ε_0/kT_k Along C_4	α_s/α_n Along C_2	ε_0/kT_k Along C_2
3.73	1.00	0.00	1.00	0.00	3.30	0.51	0.96	0.42	1.18
3.72	0.97	0.06	0.94	0.12	3.20	0.46	1.03	0.37	1.26
3.70	0.91	0.17	0.83	0.33	3.10	0.41	1.12	0.34	1.32
3.66	0.82	0.35	0.74	0.52	3.00	0.37	1.19	0.30	1.39
3.60	0.74	0.51	0.65	0.71	2.80	0.29	1.34	0.25	1.46
3.55	0.68	0.62	0.59	0.82	2.50	0.20	1.48	0.18	1.54
3.50	0.64	0.70	0.55	0.91	2.10	0.12	1.54	0.11	1.60
3.40	0.57	0.84	0.48	1.06					

with the isotropic theory of superconductivity is obtained for the case of sound propagation along the fourfold axis.

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STORAGE OF COLD NEUTRONS

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THE idea of retaining slow neutrons has been mentioned many times, but the corresponding experiments have not yet been performed, and the literature does not contain even rough estimates pertaining to this problem.

It is known that slow neutrons experience total internal reflection in glancing incidence on the surface of most substances. At sufficiently low velocities, the neutrons cannot penetrate in such a substance even under normal incidence. Thus, for carbon with a density $\sim 2 \text{g/cm}^3$ the critical neutron velocity is close to 5 m/sec, for beryllium it is approximately 7 m/sec. Let us place neutrons in a cavity surrounded on all sides by graphite. The neutrons of speed higher than critical will rapidly leave the cavity, but neutrons of less than critical speed are blocked in the cavity and vanish only as they decay, with a half-life of approximately 12 minutes. Such slow neutrons will penetrate into the wall only a depth on the order of their wavelength; taking into account dimensionless factors, the depth is $\sim 10^{-6}$ cm. Therefore if the cavity has a considerable volume, the fraction of the time that the neutrons stay in the material of the shell is quite small; for a one-cubic-meter cavity this fraction is $\sim 10^{-7}$.

The capture cross section of carbon (4.5×10^{-27} cm^2 at $v = 2.2 \times 10^5$ cm/sec) obeys the $1/v$ law and corresponds to a neutron lifetime in carbon of ~ 0.01 sec regardless of its velocity. For neutrons in a cavity we obtain an absorption time of $0.01/10^{-7}$ $= 10^5$ sec 1 day. Slow neutrons will also be lost, as they acquire energy by collision; obviously, however, this process is greatly suppressed, because the neutrons are for the most time in the cavity and not in the material of the shell.

The most difficult feat is to obtain a sufficient number of such neutrons. For a Maxwellian distribution at room temperature, the fraction of such neutrons is on the order of 10^{-8}.

It is advisable first to cool the neutrons in a volume filled with liquid helium, and then the fraction of the necessary neutrons increases to 10^{-5}. As a result of the long life of the slow neutrons in the cavity, their concentration after a few seconds becomes equal to the Maxwellian equilibrium concentration. The principal difficulty is connected with the need for having a large volume of liquid helium, because of the long range of the neutrons in helium (50 cm).

With a fully moderated neutron flux of 10^{12} cm^{-2} sec^{-1} from a reactor, the flux of neutrons emitted with a temperature of 3° K can amount to 10^{11} cm^{-2} sec^{-1}, which corresponds at an average velocity on the order of 2×10^4 cm/sec to a density of 5×10^6 cm^{-3} of thermal neutrons, in-