The line width will be of the order[2,3] $\gamma = n\gamma_0 \approx 10^5\,\text{sec}^{-1}$.

Finally we note that one can use the Stark effect to excite radiation in a similar manner in an electrical field.

The author thanks Professor V. L. Ginzburg for discussing the present paper.

*The role of such objects can be played by molecules in a gas, nuclei or electrons in a paramagnetic, ferromagnetic or ferrite, and so on.

†Below we shall speak about electrons, to fix our ideas, although all this applies equally well to nuclei, ions, and so on.

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SCATTERING OF DEUTERONS BY DEUTERIUM AND TRITIUM AT LOW ENERGIES

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RECENTLY, a remarkable number of measurements were completed on the effective cross sections of the reactions $H_1^3(d,n)He_2^4$ (Ref. 1) and $He_2^3(d,p)He_2^4$, (Ref. 2) which have maximum yield in the low energy region. The experimentally measured values of the cross section are well described by the resonance formula of Wigner and Eisenbud[3] for a single level. In this case, as is to be expected when one starts from the hypothesis of charge invariance, the resonance parameters (obtained from analysis of the reaction) which correspond to the levels of the compound nuclei He_2^5 and Li_3^5 agree within the limits of accuracy with which they are determined. It is natural to expect that the resonance scattering D − T and D − He^3, if the approach of Wigner and Eisenbud is valid for such light nuclei, should be described by the same parameters as the reactions. The scattering of D − He^3 was investigated experimentally by Freier and Holmgren.[4] In the present work, the cross section of D − T scattering was measured at an angle of 90° in the energy interval 30 − 300 kev (center of mass system). In line with this, in the process of working up the method, we measured the scattering cross section of deuterons on deuterium in the energy range for the deuterons from 100 to 600 kev at an angle of 67° in the center-of-mass system. The results obtained for 600 kev agreed with the data of Heydenburg and Roberts.[5]

Utilization of the method possessed certain characteristics which permitted us to complete the measurements at very low energies (down to 70 kev) in the region of resonance of the D − T reaction. The intensity of the beam of bombarding particles was determined by the yield of nuclear reactions which accompany the reaction. In order to be certain of separating the extraneous pulses, coincidences were recorded between the scattered particles and the recoil nucleus. The scattered particles were recorded by proportional counters which were not isolated from the gas target by a small window and were filled, together with the target, to a pressure of 2 − 5 mm of mercury.

The results of the measurement for the D − D scattered are shown in Fig. 1 and those for the D − T scattering in Fig. 2. In both cases, the ratio of the measured cross section to the effective cross section of scattering by a Coulomb field at the same angle is shown.

At small energies, it must be expected that the nuclear D − D scattering will consist of S-scattering in the singlet and quintuplet states. Phase analysis of the data of Eisenbud and Roberts on D − D scattering at 900 kev supports this assumption and allows us to determine the phase for the quintuplet state. This phase essentially determines the scattering cross section.

Measurements of the cross section for a single angle, carried out in the present research, allow only an estimate of the phase in the quintuplet state. The values obtained under the assumption that the phases in both states are the same, corre-

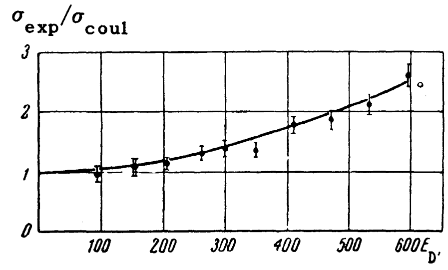

FIG. 1. ● – data of present research; ○ – data of Heydenburg and Roberts.

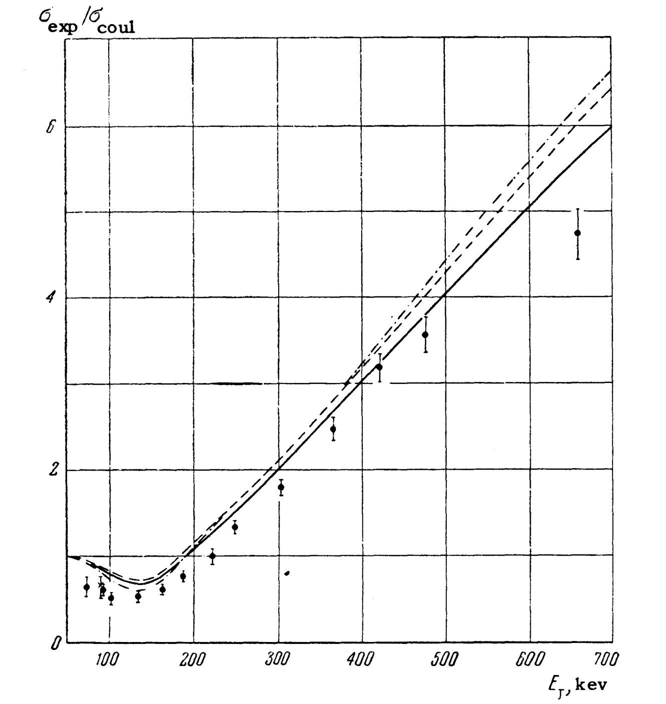

FIG. 2. a – radius of channel, γ_1 – reduced partial width of scattering, γ_2 – reduced partial width of reaction, E_0 – formal resonance energy. Continuous curve: $a = 0.5 \times 10^{-12}$ cm, $\gamma_2 = 2.16 \times 10^{-11}$ kev cm; $E_0 = -444$ kev; dashed curve: $a = 0.7 \times 10^{-12}$ cm, $\gamma_1 = 0.51 \times 10^{-9}$; $\gamma_2 = 1.27 \times 10^{-11}$ kev cm, $E_0 = -130$ kev; dash-dotted curve: $a = 0.7 \times 10^{-12}$ cm, $\gamma_1 = 0.34 \times 10^{-9}$ $\gamma_2 = 1.18 \times 10^{-11}$ kev cm; $E_0 = -55$ kev.

spond to a scattering from an ideally reflecting sphere, surrounded by a Coulomb field, with a spherical radius of 4×10^{-13} cm. The curve is drawn in Fig. 1 for the effective cross section, computed under this assumption. The potential scattering in the quintuplet state is natural, inasmuch as the spins of all the nucleons are parallel in this state.

The character of the dependence of the D – T scattering on the energy in the region of small energies (see Fig. 2) points to the presence of resonance scattering. Computed curves are drawn in the Figure for several values of the resonance parameters, determined from analysis of the reaction. In the computation, potential scattering was also taken into consideration. The experimental values for the cross section of scattering is close to the computed curve; however, it is lower by about 20%.

For energies below 100 kev, the gap between the experimental points and the computed curve is possibly connected with a systematic error in the determination of the energy of the scattered particles. In subsequent research, it is proposed to improve the accuracy of measurements in this region* and to carry out a more detailed analysis of the results with the aim of clarifying the possibility of choice of parameters which would have described equally well both the reaction and the scattering.

*Note added in proof (March 22, 1958). As a result of improving the accuracy of energy measurement of the particles under consideration, we obtained values of 0.98 ± 0.13; 0.79 ± 0.08; 0.63 ± 0.04 corresponding to energies 76, 96 and 140 kev. For high energies, the curve, which we can obtain by means of the experimental points, is not changed.

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OSCILLATION OF THE ELECTRICAL RESISTANCE OF n-TYPE GERMANIUM IN STRONG PULSED MAGNETIC FIELDS

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We have investigated the change in the electrical resistance of three monocrystalline specimens of n-type germanium in a transverse pulsed magnetic field with magnetization up to 120 kG at temperatures of 300, 77 and 20°K.

The magnetic field was produced by the discharge of a condenser stack through a solenoid, in