A comparison of the equation of state of cesium with the equation of state of mercury shows that in the gas phase the compressibilities of cesium and mercury coincide, but in the liquid phase the compressibility of the cesium greatly exceeds that of mercury. Comparing the equations of state of cesium with measurements of the electric conductivity of cesium at analogous pressures and temperatures [2, 4], it can be stated that a 30% decrease of the density of cesium changes its conductivity by three orders of magnitude.

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CHANNELING OF POSITRONS IN SINGLE CRYSTALS

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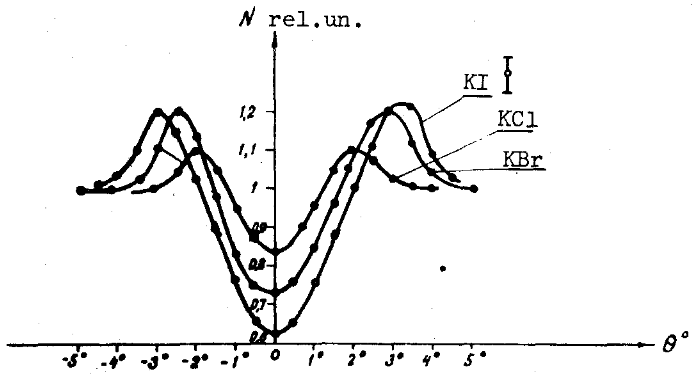
The channeling of heavy charged particles, especially protons, in single crystals has been the subject of many experimental and theoretical studies and has found practical applications [1, 2]. The information of the channeling of light charged particles, particularly positrons, is still insufficient to determine the laws governing this effect and its influence of the interaction between positrons and crystals.

The purpose of this study was to observe experimentally the influence of positron channeling on their back-scattering from single crystals.

The experiment was performed using positrons from radioactive Na^{22}. We measured the counting rate of positrons scattered through 150° relative to the direction of incidence of the primary beam. The divergence of the primary beam was ±0.5°. The scattered positrons were registered by means of the correlated annihilation quanta, using a double-coincidence circuit.

The dependence of the measured counting rate of the positrons scattered through 150° on the orientation of KCl, KBr, and KI crystals relative to the direction of incidence of the primary beam is shown in the figure.



Counting rate of the positrons scattered back at an angle 150° vs. the angle of rotation of the crystal relative to the direction of the incident beam.

The obtained distributions were normalized to the counting rate for the case of total disorientation of the crystal, i.e., practically for an amorphous target. The minimum of the counting rate of the back-scattered positrons is observed when the direction of incidence of the primary beam coincided with the <100> direction of the target crystal, and is due to the effect of channeling of the primary beam of the positron in the crystal. A consequence of the effect of positron channeling is a decrease in the probability of large-angle scattering of the positrons and an increase of the depth of penetration of the positrons into the crystals. The channeling efficiency, determined by the depth of the observed minimum of the distribution, increases with increasing atomic number of the target; this agrees with the conclusions of Linhard's channeling theory [3].

The table lists the values of the width of the minimum ψ_1 at half its depth, calculated in accordance with Linhard's theory for the mean energy of the spectrum of the Na^{22} positrons, and the experimental values of $\Delta\psi$ obtained by us for KCl, KBr, and KI single crystals.

Parameter \ Crystal	KCl	KBr	KI
d	2,81	3,20	3,80
Z_{eff}	14,70	18,00	34,20
ψ_1	1,5°	1,8°	2,6°
$\Delta\psi$	1,6°	2,1°	3,0°

As seen from the table, the observed half-width of the minimum increases with increasing lattice parameter d and effective atomic number Z_{eff} of the crystal. This agrees with the conclusions of the theory. The good agreement between the theoretical and experimental results may mean that the classical approach to the channeling effect is still valid in our case, although the dynamic theory of diffraction of positron waves may offer a more accurate description of this effect.

The observed effect in back scattering of positrons from crystals confirms the previously advanced hypothesis that the influence of positron channeling may become manifest in different processes of their interaction with crystals, making practical use of this effect possible in the future.

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INFLUENCE OF EXCITATION OF H_2^+ and D_2^+ ON THE CROSS SECTION FOR THEIR DISSOCIATION IN COLLISIONS WITH ATOMS AND MOLECULES IN THE ENERGY REGION FROM 0.1 TO 2 keV

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It is known that the dissociation of H_2^+ ions by collision with atoms and molecules can occur in two ways, by excitation of the repulsive electron states and by momentum transfer to the nuclei [1]. In the first, the dissociation of H_2^+ occurs predominantly at collision energies from several keV up [2]. A