that described by Voronova et al. The temperature gradient over the chamber height did not exceed 1 K.

The positive space charge which is formed near the cathode by the extremely small ionic (hole) mobility \((-10^{-2} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1})\) and weakens the external field can introduce an appreciable error when working in weak fields. The drift velocity then obtained corresponds to some total field, the value of which is not known, while the mobility \(\mu = V/E\) is less than the true value. In the present work the x-ray pulse produced \(\approx 10^6\) electron-ion pairs in the chamber. Under these conditions the current pulse observed in fields \(< 100 \text{ V cm}^{-1}\) was rectangular at an x-ray pulse repetition frequency 0.1 to 1 Hz. Increasing the repetition frequency led to distortion of the current pulse shape (or to a nonlinear voltage pulse front), which indicated field distortions in the gap between the electrodes. For comparison, the radiation-pulse repetition frequency used by Miller et al. was 50 Hz and the charge produced by a pulse was not less than \(2 \times 10^4\) electron-ion pairs.

The total error in a single measurement of the drift velocity at a fixed field value was not more than 3.5%.

**EXPERIMENTAL RESULTS**

The results of this investigation are shown in Figs. 1 to 4 and in Table I, and the main conclusions are as follows.

1. The doubly-logarithmic plot of drift velocity vs electric field strength has some clearly defined linear sections (Figs. 1 and 2), so that in each section the drift velocity can be well approximated by the expression \(V = Be^\alpha\), where \(B\) and \(\alpha\) are constants for a given temperature. As the field strength increases, \(\alpha\) changes from 1 (\(V = \mu_o E\)) to 0 (\(V = \mu_a = \text{const}\).).

2. The linear section \(V = \mu_a E\) was reliably measured and contains at least 20 to 30 experimental points for each temperature. The mobility \(\mu_a\) was determined from the value of the drift velocity at the intersection of the extrapolation of the linear section \(V = \mu_a E\) on the doubly logarithmic plot with the ordinate axis at \(E = 1 \text{ V cm}^{-1}\). As noted before, \(\mu_a\) the temperature dependence of \(\mu_a\) (Fig. 3) is very nonmonotonic; the maximum electron mobility \((5500 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1})\) is reached in liquid xenon at 220 K. In solid xenon, \(\mu_a\) increases monotonically with decreasing temperature from 2900 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1} at \(T = 155\) to 6000 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1} at \(T = 80\) K.

3. The form of the electric field dependence of the electron drift velocity does not change with temperature, except for liquid xenon where there is a characteristic dip at \(E = 10^2\) to \(10^3 \text{ V cm}^{-1}\) (Fig. 1) far from the triple point in the region of the maximum of the \(V(E)\) curve; this dip is absent for gaseous noble gases. The electron drift velocity in liquid argon evidently behaves in a similar way near 145 K.

4. In condensed xenon the drift velocity reaches saturation in fields above 2 to 4 \text{ kV cm}^{-1}, and the satura-

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**FIG. 1.** Electric field dependence of the drift velocity of electrons in condensed xenon at the following temperatures: liquid: \(\Delta = 165\), \(\circ = 200\), \(\Delta = 230\) K. Crystal: \(\triangle = 155\), \(\square = 140\), \(\circ = 120\), \(\Delta = 100\) K.

**FIG. 2.** Electric field dependence of the drift velocity of electrons in condensed argon at the following temperatures: liquid: \(\Delta = 65\), \(\circ = 100\), \(\circ = 130\), \(\Delta = 130\) K, crystal: \(\triangle = 90\) K.

**FIG. 3.** Temperature dependence of electron mobility in the limit of zero field; \(L\) — liquid, \(S\) — crystal. Dashed lines—results of earlier work: 1—Ref. 3, 2—Ref. 5.