[illegible] 621.315.592
[illegible]
[illegible] 75, [illegible] 43018, [illegible]
e-mail: luniovser@mail.ru

[illegible] Ξ_u [illegible] Ξ_d [illegible]
$\gamma -$ [illegible] $n-Si$

[illegible] $X // J //[100]$, [illegible] Ξ_u [illegible] Ξ_d [illegible] $n-Si$. [illegible] $n-Si$ [illegible] $E_c - 0{,}17$ [illegible]

[illegible]

[illegible] [1], [illegible]

[illegible]

[illegible] Ξ_u [illegible] Ξ_d [illegible] $\gamma -$ [illegible] $n-Si$ [illegible] (Ξ_u [illegible] Ξ_d). [illegible] Ξ_d [illegible] $n-Si$ [illegible] X [illegible] [111], [illegible] [2].

[illegible] $\gamma -$ [illegible] $n-Si$ [illegible] $n = 1{,}1 \cdot 10^{14}$ [illegible]$^{-3}$ [illegible]

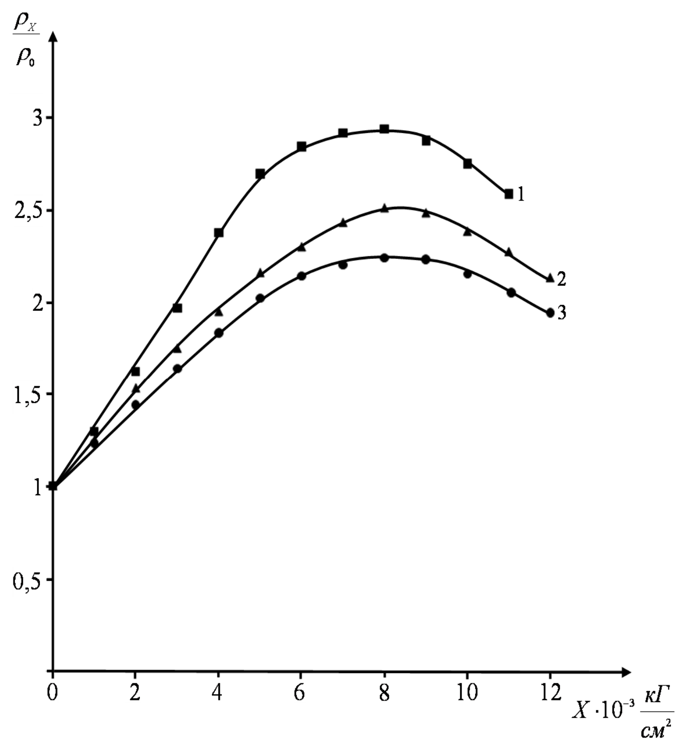
$E_c - 0{,}17$ [illegible] $X \,//\, J \,//[100]$. [illegible] γ- [illegible] $n-Si$ [illegible] $E_c - 0{,}17$ [illegible], [illegible] Φ-[illegible] [3].

[illegible] 1 [illegible] γ- [illegible] $n-Si$ [illegible] $X \,//\, J \,//[100]$. [illegible] $n-Si$ [illegible] $\frac{\rho_X}{\rho_0} = f(X)$ [illegible] $E_c - 0{,}17$ [illegible] [4].

[illegible] T_0, [illegible] [5],

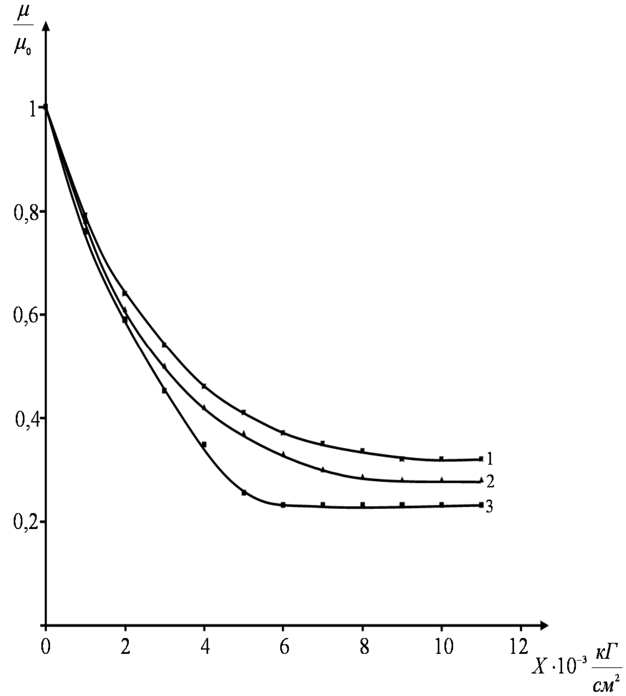
$$\mu = \mu_0 \frac{\left\langle \dfrac{\rho_i}{\rho_{i+1}} \right\rangle^{-\frac{X}{\Delta X}}}{\dfrac{\rho(T_0, X)}{\rho(T_0)}}, \qquad (1)$$

[illegible] ρ_i [illegible] ρ_{i+1} - [illegible] X_i [illegible] X_{i+1} [illegible]; $X_i, X_{i+1} > X^{/}$, [illegible] $X^{/}$ - [illegible] $\frac{\rho_X}{\rho_0} = f(X)$ [illegible] μ_0 - [illegible] T_0.



[illegible] 1. [illegible] $\frac{\rho_X}{\rho_0} = f(X)$ $\gamma -$ [illegible] $n-Si$ [illegible] $1{,}9 \cdot 10^{17}$ [illegible] $X \,//\, J \,//[100]$, [illegible] T, K : 1-77; 2-110; 3-150.

[illegible] (1) [illegible] 1, [illegible] $\frac{\mu}{\mu_0} = f(X)$ [illegible] $n-Si$ [illegible] $E_c - 0{,}17$ [illegible] (2).



[illegible] 2. [illegible] $\frac{\mu}{\mu_0} = f(X)$ γ – [illegible] $n-Si$ [illegible] $1{,}9 \cdot 10^{17}$ [illegible] $X \,//\, J \,//[100]$, [illegible] T, K: 1-150; 2-110; 3-77.

[illegible] 2, [illegible] $\frac{\mu}{\mu_0} = f(X)$ [illegible] X [illegible] $n-Si$, [illegible] $X \,//\, J \,//[100]$. [illegible] $E_c - 0{,}17$ [illegible] $n-Si$ [illegible] [6].

[illegible] [1]:

$$\mu = \mu_\perp \sin^2\theta + \mu_\parallel \cos^2\theta, \qquad (2)$$

[illegible] θ - [illegible] $\mu_\perp$ [illegible] $\mu_\parallel$ - [illegible]

[illegible] $n-Si$ [illegible] $X \,//[100]$ [illegible] (2), [illegible]:

$$\mu_1 = \mu_\parallel, \mu_2 = \mu_\perp \qquad (3)$$

[illegible] $n-Si$ [illegible] $X \,//[100]$ [illegible]:

$$\sigma_X = 2en_1(X)\mu_\parallel + 4en_2(X)\mu_\perp = en(X)\mu(X), \qquad (4)$$

$n_1(X)$ – [illegible], $n_2(X)$ – [illegible], $n(X)$ – [illegible].

© [illegible]

[illegible] $E_c - 0{,}17$ [illegible] X, [illegible] K_τ [illegible] X. [illegible] K_τ [illegible] $n-Si$ [illegible] $E_c - 0{,}17$ [illegible] [7] [illegible] $T > 100K$.

[illegible] (4) [illegible] X_1 [illegible] X_2, [illegible] X [illegible] X_1 [illegible] X_2 [illegible] $E_c - 0{,}17$ [illegible].

$$\sigma_{X_1} = 2en_1(X_1)\mu_{\parallel} + 4en_2(X_1)\mu_{\perp} = en(X_1)\mu(X_1) \qquad (5)$$

$$\sigma_{X_2} = 2en_1(X_2)\mu_{\parallel} + 4en_2(X_2)\mu_{\perp} = en(X_2)\mu(X_2) \qquad (6)$$

[illegible]:

$$\begin{cases} 2n_1(X_1) + 4n_2(X_1) = n(X_1) \\ 2n_1(X_2) + 4n_2(X_2) = n(X_2) \end{cases}, \quad \begin{cases} \dfrac{n_2(X_1)}{n_1(X_1)} = e^{-\frac{\Delta E_1}{kT}} = a_1 \\ \dfrac{n_2(X_2)}{n_1(X_2)} = e^{-\frac{\Delta E_2}{kT}} = a_2 \end{cases}, \qquad (7)$$

[illegible] ΔE_1, ΔE_2 – [illegible] X_1 [illegible] X_2 $n-Si$ [illegible] [100].

[illegible] (5), (6) [illegible] (7), [illegible]:

$$\frac{\mu(X_1)}{\mu(X_2)} = \frac{\mu_{\parallel} + 2\mu_{\perp}a_1}{\mu_{\parallel} + 2\mu_{\perp}a_2} \cdot \frac{1+2a_2}{1+2a_1} \qquad (8)$$

[illegible]

$$\frac{\mu(X_1)}{\mu(X_2)} = \frac{1+2Ka_1}{1+2Ka_2} \cdot \frac{1+2a_2}{1+2a_1}, \qquad (9)$$

[illegible] $K = \dfrac{\mu_{\perp}}{\mu_{\parallel}}$ – [illegible].

[illegible] K [illegible] (9):

$$K = \frac{(1+2a_2)\mu(X_2) - (1+2a_1)\mu(X_1)}{2a_2(1+2a_1)\mu(X_1) - 2a_1(1+2a_2)\mu(X_2)} \qquad (10)$$

$$K = \frac{K_m}{K_\tau}, \qquad (11)$$

[illegible] K_m – [illegible] K_τ – [illegible].

[illegible] (10) [illegible] (11),

$$K_\tau = K_m \frac{2a_2(1+2a_1)\mu(X_1) - 2a_1(1+2a_2)\mu(X_2)}{(1+2a_2)\mu(X_2) - (1+2a_1)\mu(X_1)} \qquad (12)$$

[illegible] K_τ [illegible] [9].

$$K_\tau = \frac{\langle \tau_{\parallel} \rangle}{\langle \tau_{\perp} \rangle} \qquad (13)$$

$$\langle \tau_{\parallel} \rangle = \int_0^\infty dx x^{\frac{3}{2}} e^{-x} \tau_{\parallel}, \quad \langle \tau_{\perp} \rangle = \int_0^\infty dx x^{\frac{3}{2}} e^{-x} \tau_{\perp} \qquad (14)$$

[illegible] $\tau_{\parallel}$ [illegible] $\tau_{\perp}$ [illegible]:

$$\tau_{\parallel}=\frac{a_{\parallel}}{\sqrt{k_{Б}}T^{\frac{3}{2}}}\cdot\frac{x^{\frac{3}{2}}}{x^{2}+b_{0}},\ \tau_{\perp}=\frac{a_{\perp}}{\sqrt{k_{Б}}T^{\frac{3}{2}}}\cdot\frac{x^{\frac{3}{2}}}{x^{2}+b_{1}},\qquad(15)$$

[illegible] $a_{\parallel}=\frac{\pi c_{11}\hbar^{4}}{k_{Б}\Xi_{d}^{2}\sqrt{2m_{\parallel}m_{\perp}^{2}}}\cdot\frac{1}{\Lambda_{0\theta}},\ a_{\perp}=\frac{\pi c_{11}\hbar^{4}}{k_{Б}\Xi_{d}^{2}\sqrt{2m_{\parallel}m_{\perp}^{2}}}\cdot\frac{1}{\Lambda_{1\theta}}$ (16) $\Lambda_{0\theta}=1+1{,}645\frac{\Xi_{u}}{\Xi_{d}}+1{,}03\frac{\Xi_{u}^{2}}{\Xi_{d}^{2}},$

$$\Lambda_{1a}=1+0{,}818\frac{\Xi_{u}}{\Xi_{d}}+0{,}688\frac{\Xi_{u}^{2}}{\Xi_{d}^{2}}\qquad(17)$$

$$b_{0}=\frac{a_{\parallel}\Lambda_{0i}}{\sqrt{k_{Б}}T^{\frac{3}{2}}\tau_{0i}(kT)},\ b_{1}=\frac{a_{\perp}\Lambda_{1i}}{\sqrt{k_{Б}}T^{\frac{3}{2}}\tau_{0i}(kT)},\qquad(18)$$

$$\tau_{0i}(k_{Б}T)=\frac{\sqrt{2}m_{\perp}\varepsilon_{0}^{2}(k_{Б}T)^{\frac{3}{2}}}{\pi ne^{4}\sqrt{m_{\parallel}}},\qquad(19)$$

[illegible] $n-$ [illegible], $\varepsilon_{0}-$ [illegible], $e-$ [illegible]

$$\Lambda_{0i}=\frac{3}{2\beta^{3}}[(\frac{\beta}{1+\beta^{2}}-a)\ln\gamma^{2}-a\ln(1+\beta^{2})+2L(a)+$$
$$\frac{\beta\gamma^{2}}{2}(\frac{\beta^{2}-1}{\beta^{2}+1}+\frac{a(\beta^{2}+1)}{\beta})],$$
$$\Lambda_{1i}=\frac{3}{4\beta^{3}}[((1-\beta^{2})a-\beta)\ln\gamma^{2}+2(\beta^{2}-1)L(a)-$$
$$2\beta^{2}a-(\beta^{2}-1)a\ln(1+\beta^{2})+\frac{\gamma^{2}}{2}(\beta(1+3\beta^{2})+\qquad(20)$$
$$a(3\beta^{4}+2\beta^{2}-1))]$$

[illegible] $\beta^{2}=\frac{m_{\parallel}-m_{\perp}}{m_{\perp}}$, $a=arctg\beta$, $L(a)=-\int_{0}^{a}\ln\cos\varphi d\varphi-$ [illegible],

$\gamma^{2}=\frac{\pi\hbar^{2}e^{2}}{2m_{\parallel}\varepsilon_{0}k_{Б}^{2}}\cdot\frac{n}{T^{2}x},\ x=\frac{\varepsilon}{k_{Б}T}.$

[illegible] (16) [illegible] (19), [illegible] (18) [illegible]:

$$b_{0}=\frac{nA\Lambda_{0i}}{\Xi_{d}^{2}\Lambda_{0\theta}},\ b_{1}=\frac{nA\Lambda_{1i}}{\Xi_{d}^{2}\Lambda_{1\theta}},\qquad(21)$$

[illegible] $A=\frac{\pi^{2}c_{11}\hbar^{4}e^{4}}{2k_{Б}^{3}m_{\perp}^{2}T^{3}\varepsilon_{0}^{2}}.$

[illegible] (12-21), [illegible]:

$$\frac{\Lambda_{1\sigma}}{\Lambda_{0\sigma}}\cdot\frac{\displaystyle\int_0^\infty dx\frac{x^3e^{-x}}{x^2+\dfrac{nA\Lambda_{0\varepsilon}}{\Xi_d^2\Lambda_{0\sigma}}}}{\displaystyle\int_0^\infty dx\frac{x^3e^{-x}}{x^2+\dfrac{nA\Lambda_{1\varepsilon}}{\Xi_d^2\Lambda_{1\sigma}}}}= \tag{22}$$

$$=K_m\frac{2a_2(1+2a_1)\dfrac{\mu(X_1)}{\mu_0}-2a_1(1+2a_2)\dfrac{\mu(X_2)}{\mu_0}}{(1+2a_2)\dfrac{\mu(X_2)}{\mu_0}-(1+2a_1)\dfrac{\mu(X_1)}{\mu_0}}$$

[illegible] (4) [illegible] X :

$$\frac{d\sigma}{dX}=e(\mu\frac{dn}{dX}+n\frac{d\mu}{dX}) \tag{23}$$

[illegible]

$$-\frac{1}{\rho^2}\frac{d\rho}{dX}=e(\mu\frac{dn}{dX}+n\frac{d\mu}{dX}) \tag{24}$$

[illegible] [9]:

$$n=n_0e^{-\frac{\Delta E}{\alpha kT}}, \tag{25}$$

[illegible] ΔE - [illegible], α - [illegible] 1 [illegible] 2 [illegible], n_0 - [illegible].

[illegible] (25),

$$\frac{d\rho}{dX}=-en\rho^2\frac{d\mu}{dX}+\frac{\rho}{\alpha kT}\frac{d(\Delta E)}{dX}. \tag{26}$$

[illegible] $\dfrac{\rho_X}{\rho_0}=f(X)$ ([illegible] 1, [illegible] 1) [illegible] $X=X_0$, [illegible] $\dfrac{d\rho}{dX}\Big|_{X=X_0}=0$.

[illegible] $\Delta E=\dfrac{d(\Delta E)}{dX}X$ [9]. [illegible] (25) [illegible] (26),

$$\frac{\ln\left(en_0\mu(X_0)\rho(X_0)\right)}{X_0}=\frac{1}{\mu(X_0)}\frac{d\mu}{dX}\Big|_{X=X_0} \tag{27}$$

[illegible] $X\ge X_0$ [illegible] [100] [illegible] $n-Si$ [illegible] $\mu=\mu_\parallel$. [illegible]

$$\mu_\parallel=\frac{e}{m_\parallel}\left\langle\tau_\parallel\right\rangle, \tag{28}$$

[illegible] (14-20), [illegible] (27) [illegible]:

$$\frac{\ln\left(en_0\mu(X_0)\rho(X_0)\right)}{X_0} = \frac{1}{\mu(X_0)}\frac{\pi c_{11}\hbar^4}{(k T)^{\frac{3}{2}}\cdot\Xi_d\sqrt{2m_\parallel m_\perp^2}}\times$$

$$\times\frac{d}{dX}\left[\int_0^\infty dx\frac{x^3e^{-x}}{x^2+\dfrac{NA_{0}}{\Xi_d{}_{0}}}\right]\Bigg|_{X=X_0} \qquad (29)$$

[illegible]

$$\frac{A_{0}\pi c_{11} e\hbar^4}{(k T)^{\frac{3}{2}}\Xi_d^4{}_{0}\sqrt{2m_\parallel^3 m_\perp^2}}\times$$

$$\times\int_0^\infty dx\frac{x^3e^{-x}}{\left(x^2+\dfrac{A_{0}}{e\mu(X_0)\rho(X_0)\Xi_d{}_{0}}\right)^2} = e\mu^2(X_0)\rho(X_0) \qquad (30)$$

[illegible] (22) [illegible] (30), [illegible] Ξ_u [illegible] Ξ_d :

$$\begin{cases} \dfrac{{}_{1}}{{}_{0}}\cdot\dfrac{\displaystyle\int_0^\infty dx\frac{x^3e^{-x}}{x^2+\frac{nA_{0}}{\Xi_d^2{}_{0}}}}{\displaystyle\int_0^\infty dx\frac{x^3e^{-x}}{x^2+\frac{nA_{1}}{\Xi_d^2{}_{1}}}} = K_m\dfrac{2a_2(1+2a_1)\frac{\mu(X_1)}{\mu_0}-2a_1(1+2a_2)\frac{\mu(X_2)}{\mu_0}}{(1+2a_2)\frac{\mu(X_2)}{\mu_0}-(1+2a_1)\frac{\mu(X_1)}{\mu_0}} \\ B\cdot\displaystyle\int_0^\infty dx\frac{x^3e^{-x}}{\left(x^2+\frac{A_{0}}{e\mu(X_0)\rho(X_0)\Xi_d{}_{0}}\right)^2} = e\mu^2(X_0)\rho(X_0), \\ \text{[illegible]}\ B = \dfrac{A_{0}\pi c_{11}e\hbar^4}{(kT)^{\frac{3}{2}}\Xi_d^4{}_{0}\sqrt{2m_\parallel^3 m_\perp^2}} \end{cases}$$

[illegible]:

1) $\Xi_u = 9{,}23$ [illegible] [illegible] $\Xi_d = -2{,}12$ [illegible],

2) $\Xi_u = -66$ [illegible] [illegible] $\Xi_d = 29$ [illegible].

[illegible]:

1. [illegible]

2. [illegible] $n-Si$ [illegible]

3. [illegible] $n-Si$, [illegible].

[illegible] $\Xi_u = 9{,}3$ [illegible] ($\Xi_u = 9{,}23$ [illegible]), [illegible] [10], [illegible] $\gamma-$ [illegible] [11]. [illegible] Ξ_u, [illegible] [10] [illegible] [11] [illegible]

[illegible] γ – [illegible] Φ – [illegible]

[illegible] Ξ_u [illegible] Ξ_d [illegible] Ge, GaAS, GaSb, CdSb [illegible].

[illegible] [12, 13]. [illegible] [13], [illegible].

[illegible]

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