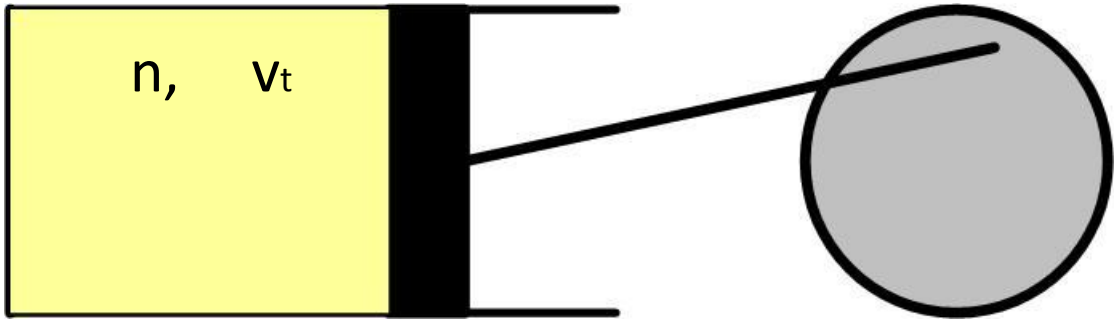
# Лекция 5

# Стохастический нагрев электронов




$$u_s = u_0 \cos(\omega t)$$

$$\Delta\varepsilon = \frac{m\left(v_t - 2\cdot u_s\right)^2}{2} - \frac{m\cdot\left(v_t\right)^2}{2}$$

$$\Delta\varepsilon = -2\, m v_t \cdot u_s + 2m\cdot\left(u_s\right)^2$$

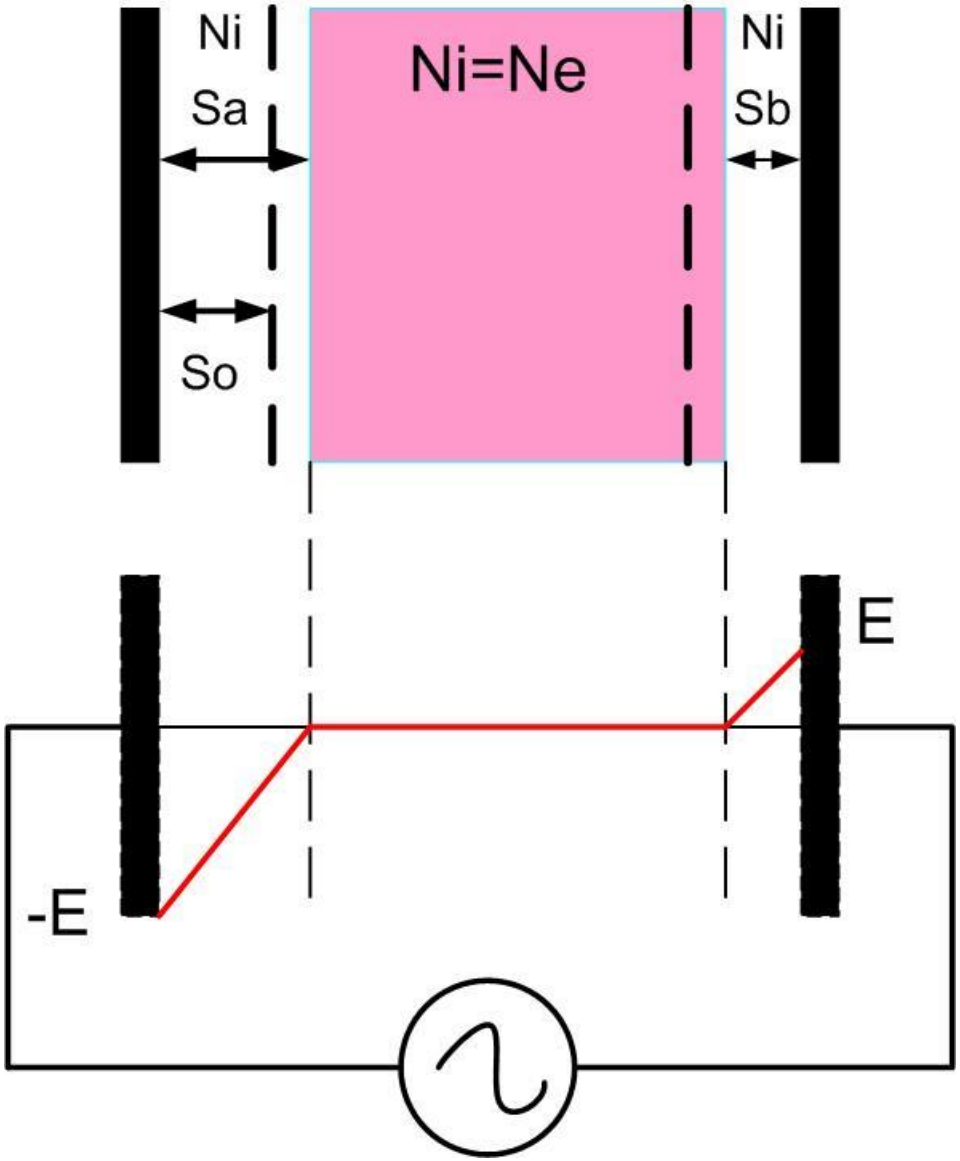
$$G = \frac{1}{4} n \cdot \left( v_t - u_s \right)$$

$$P = "" < G \cdot \Delta \varepsilon > ""$$

$$P = \frac{1}{4} \cdot n < \left( v_t - u_s \right) \cdot \left[ -2m \cdot v_t \cdot u_s + 2m \cdot \left( u_s \right)^2 \right] > ""$$

$$P = \frac{m}{2} n \cdot 2 \, v_t < \left( u_s \right)^2 > "" = \frac{1}{2} m \cdot \left( u_0 \right)^2 n v_t$$

$$P = 2m \cdot \left( u_0 \right)^2 < G > ""$$


Ni
Sa
So
Ni=Ne
Ni
Sb
E
-E

# В случае однородно движущихся электронов

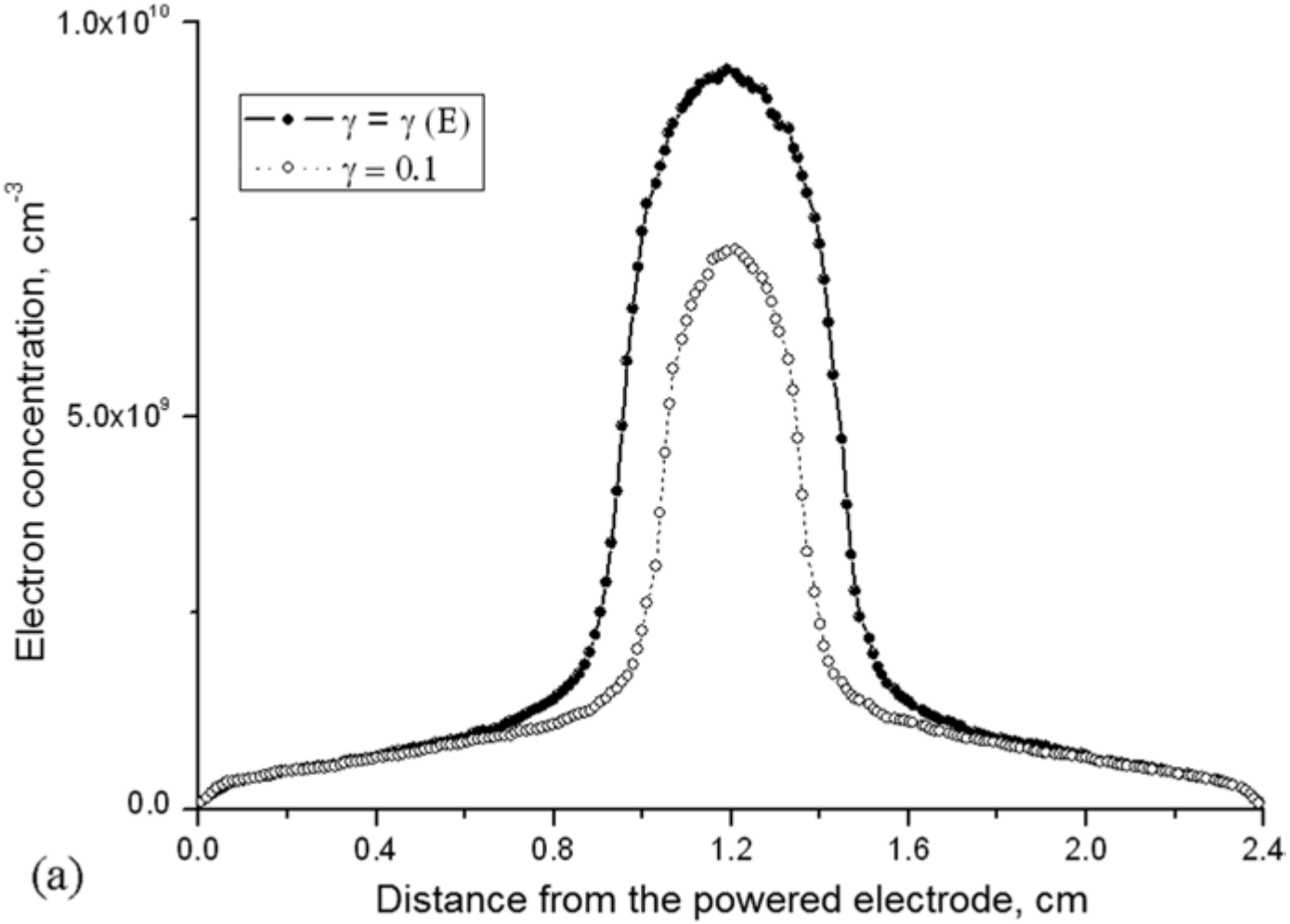
$$v_e = v_t + u_s$$

$$G_e = \frac{1}{4} n\left(v_e - u_s\right) = \frac{1}{4} n\left(v_t + u_s - u_s\right) \qquad G_e = \frac{1}{4} n \cdot v_t$$

$$\Delta\varepsilon = \frac{m}{2}\left(v_t + u_s - 2 \cdot u_s\right)^2 - \frac{m}{2}\left(v_t + u_s\right)^2$$

$$\Delta\varepsilon = \frac{m}{2} 4 \cdot u_s \cdot v_t = 2m \cdot u_s \cdot v_t$$

$$P = "" < G \cdot \Delta\varepsilon > "" = \frac{m}{2} n \cdot \left(v_t\right)^2 < u_s > "" = 0$$


1.0x10^10
5.0x10^9
0.0
Electron concentration, cm^-3
γ = γ (E)
γ = 0.1
0.0
0.4
0.8
1.2
1.6
2.0
2.4
Distance from the powered electrode, cm
(a)

$$v_e = v_t + u$$

$$\Delta\varepsilon = \frac{m}{2}\cdot\left(v_t + u - 2\cdot u_s\right)^2 - \frac{m}{2}\left(v_t + u\right)^2$$

$$\Delta\varepsilon = -2m\cdot u_s\cdot\left(v_t + u - u_s\right)$$

$$G = \frac{1}{4}n_s\cdot\left(v_t + u - u_s\right)$$

$$P = -\frac{1}{2}\cdot m < n_s\cdot u_s\left(v_t + u - u_s\right)^2 > \text{""}$$

$$P = m < n_s(u_s - u) > v_t$$

$$n_s u_s = n_0 u$$

$$P = mn_0 < u(u_s - u) > v_t$$