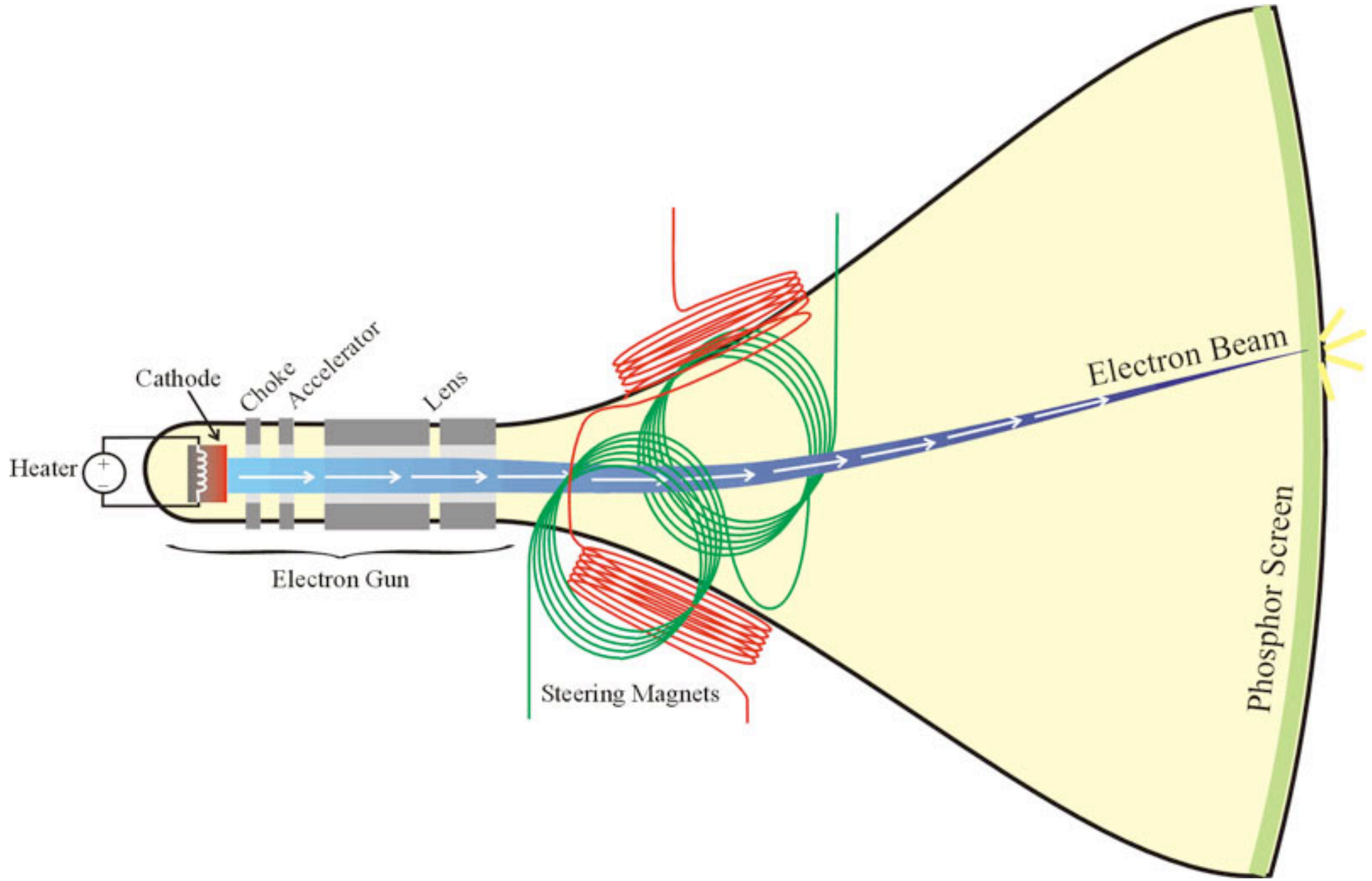
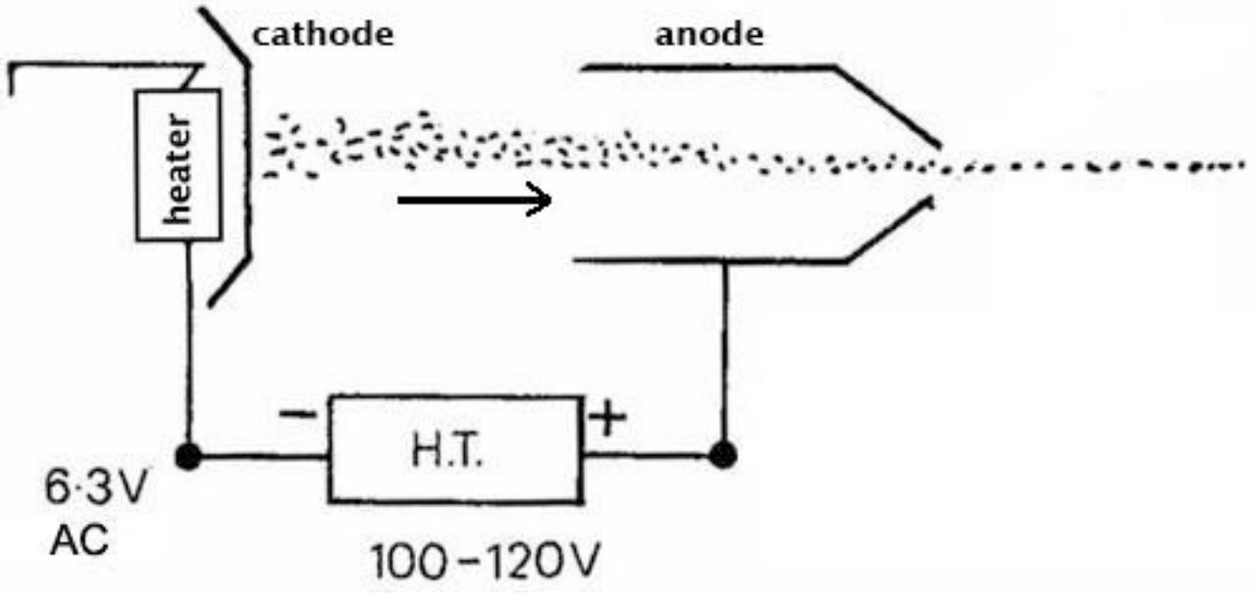
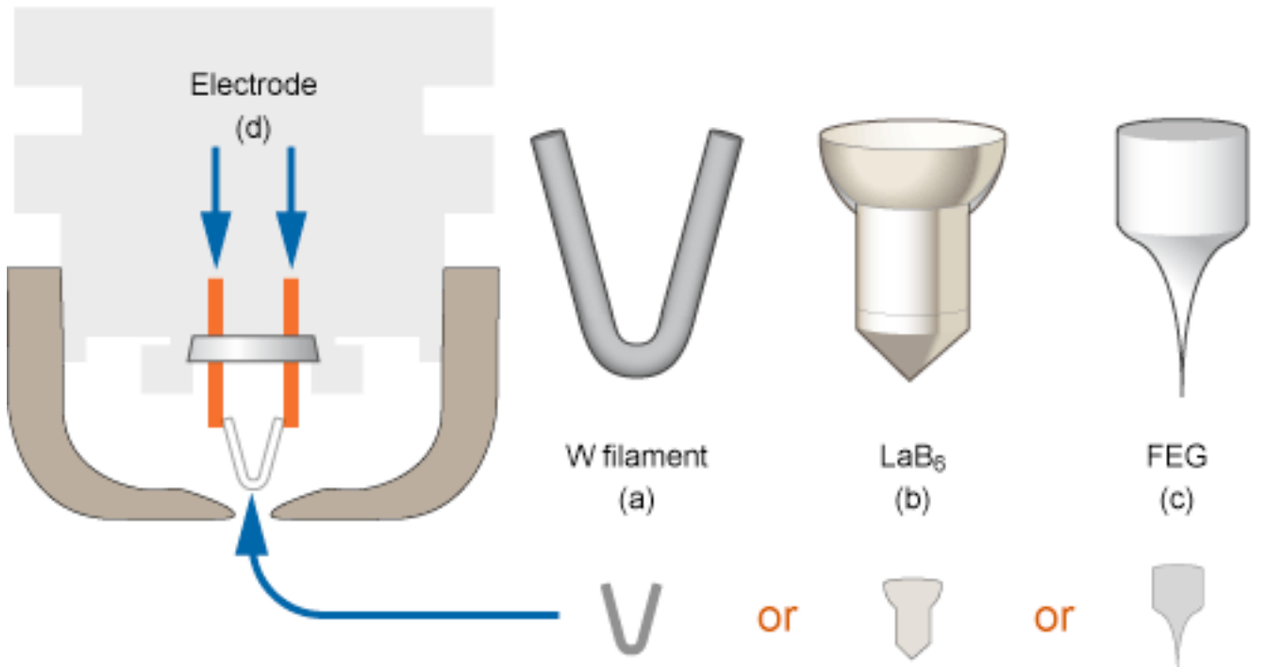
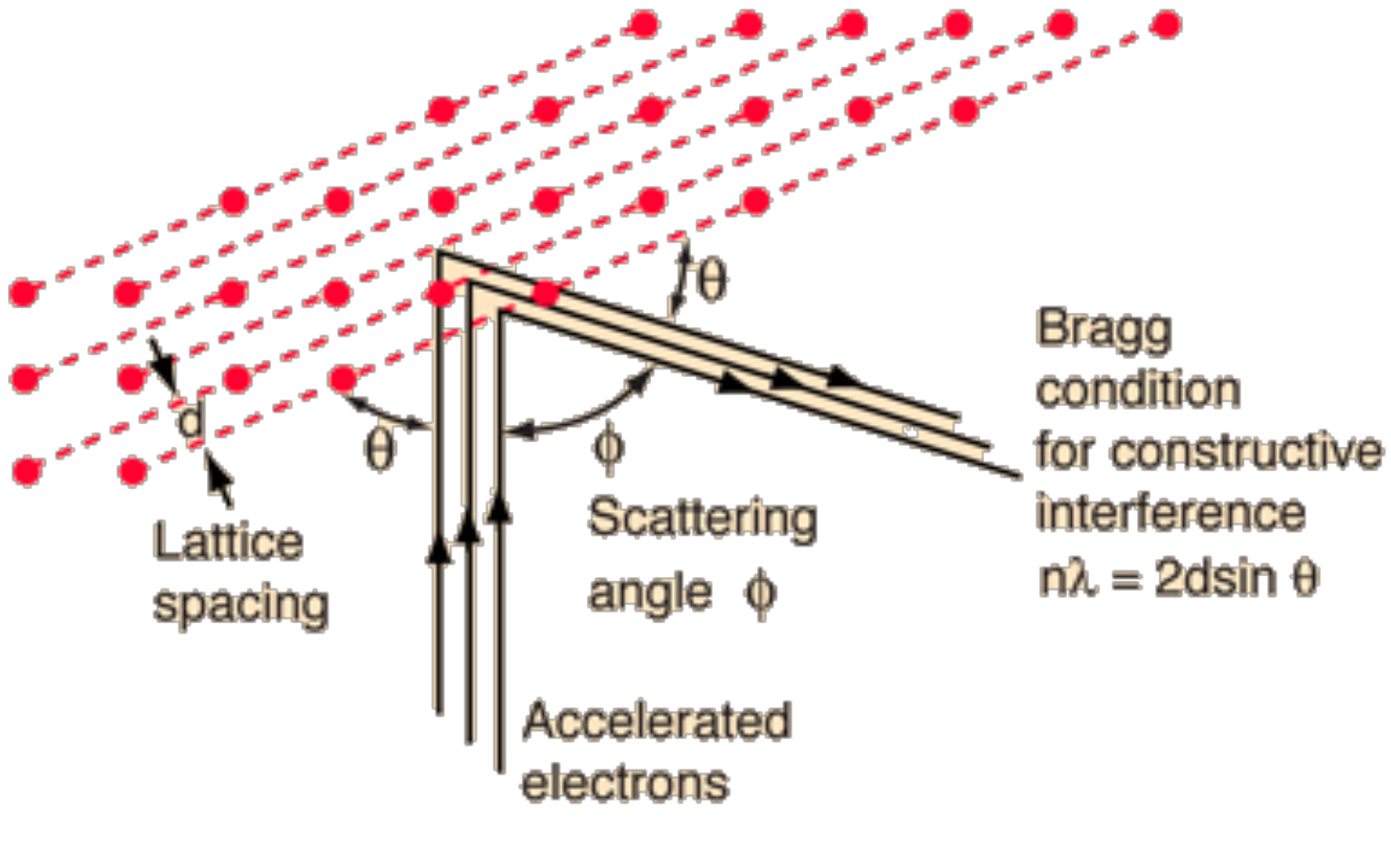
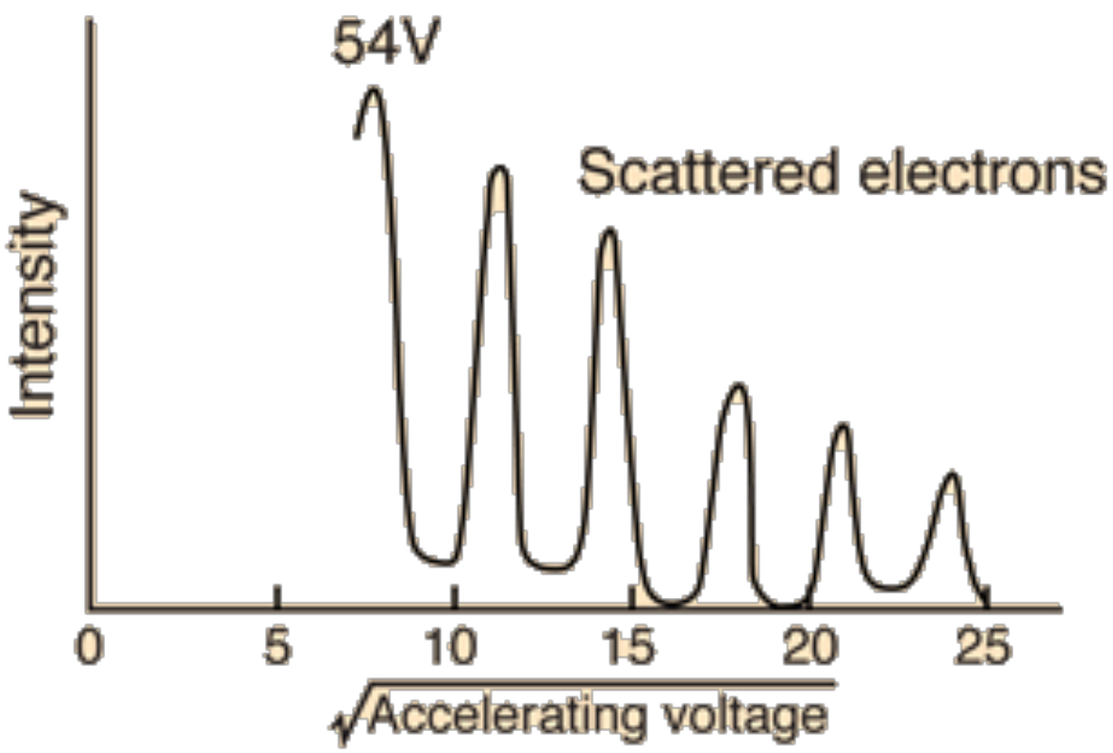
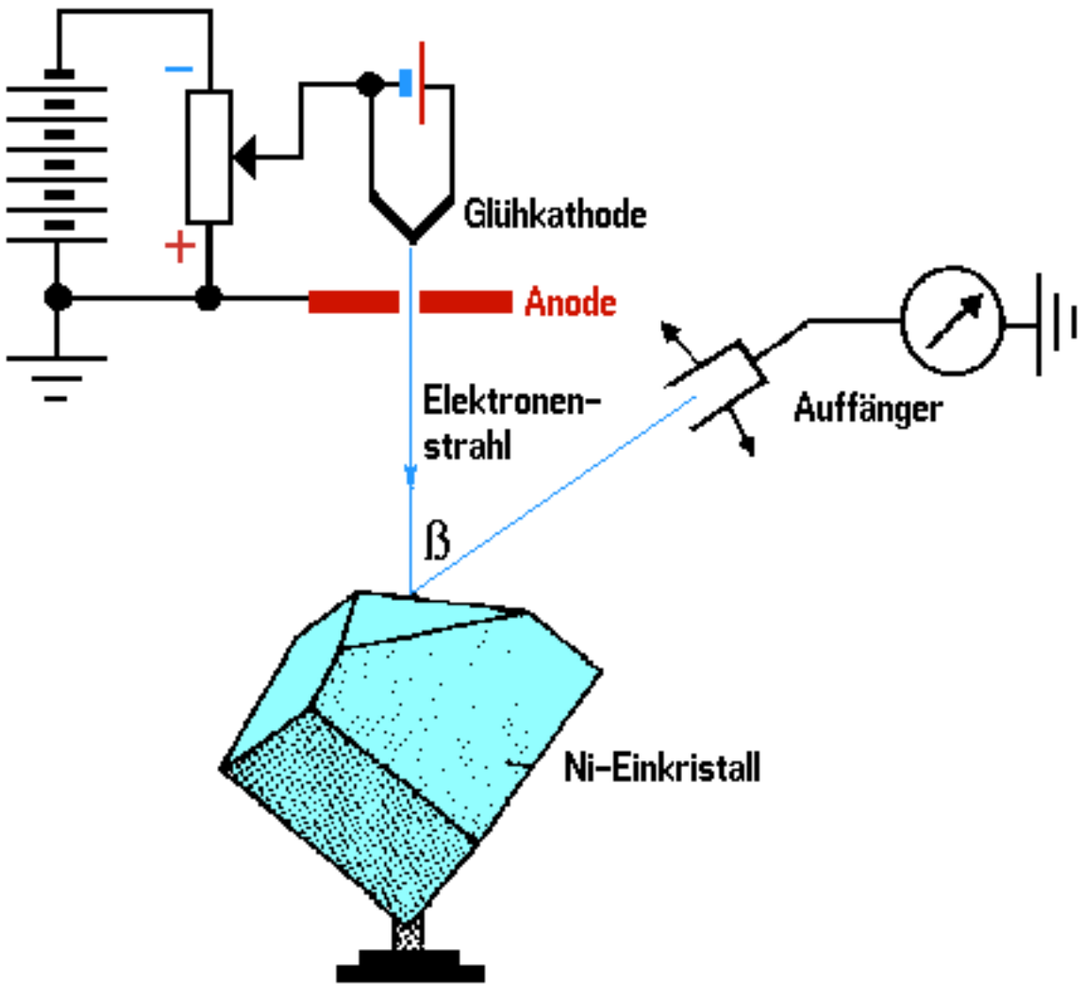

Cathode
Choke
Accelerator
Lens
Heater
Electron Gun
Steering Magnets
Electron Beam
Phosphor Screen


cathode
anode
heater
H.T.
−
+
6·3V
AC
100–120V


Electrode
(d)
W filament
(a)
LaB6
(b)
FEG
(c)
or
or


θ
d
θ
ϕ
Lattice
spacing
Scattering
angle ϕ
Bragg
condition
for constructive
interference
nλ = 2dsin θ
Accelerated
electrons


54V
Scattered electrons
Intensity
0
5
10
15
20
25
√Accelerating voltage



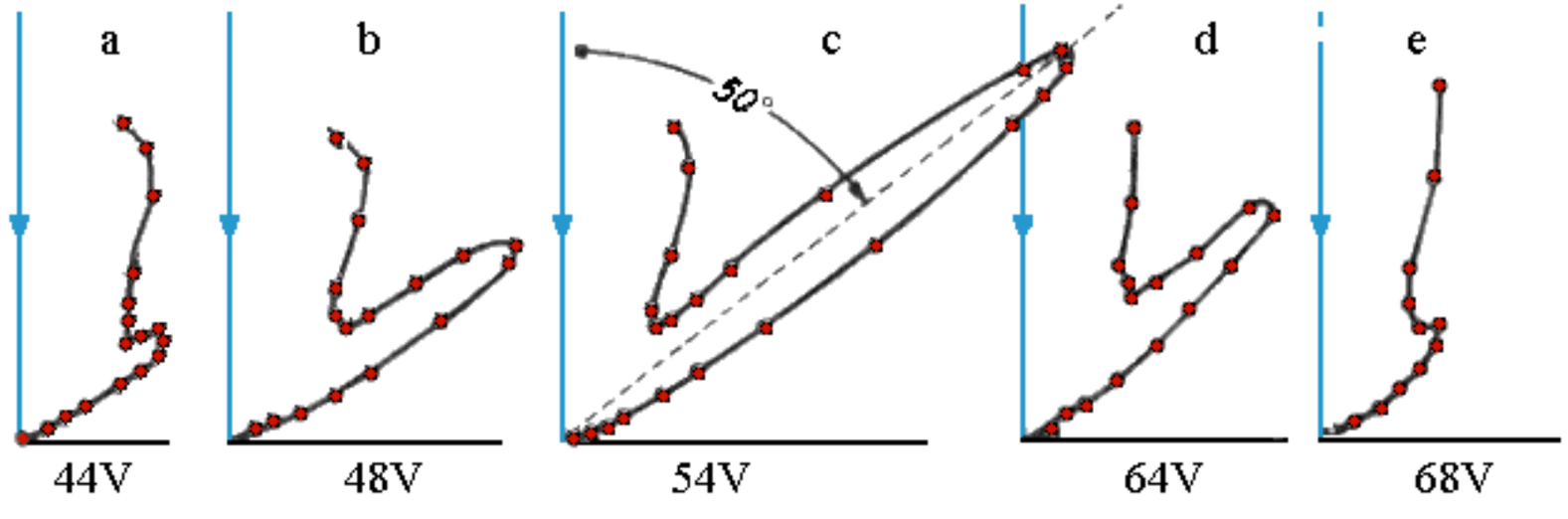
$$E_{\text{kin}} = \frac{1}{2}mv^2 = \frac{p^2}{2m}$$

$$p = \sqrt{2mE_{\text{kin}}}$$

$$\lambda = \frac{h}{\sqrt{2mE_{\text{kin}}}}$$

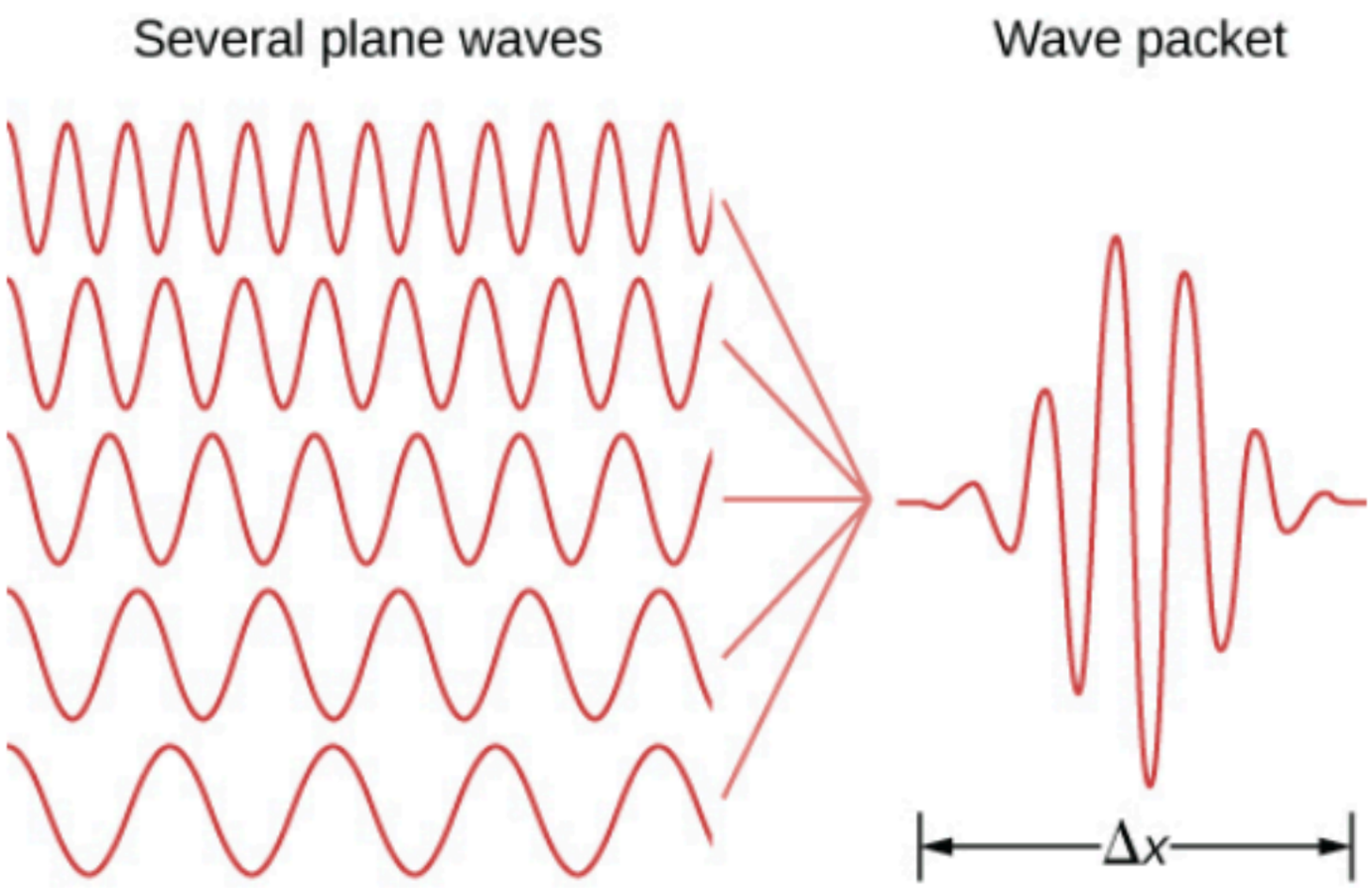
$$E_{\text{kin}} = e_0 U$$

$$\lambda = \frac{1{,}23\,nm}{\sqrt{U[V]}}$$



$$U = 50\,V$$

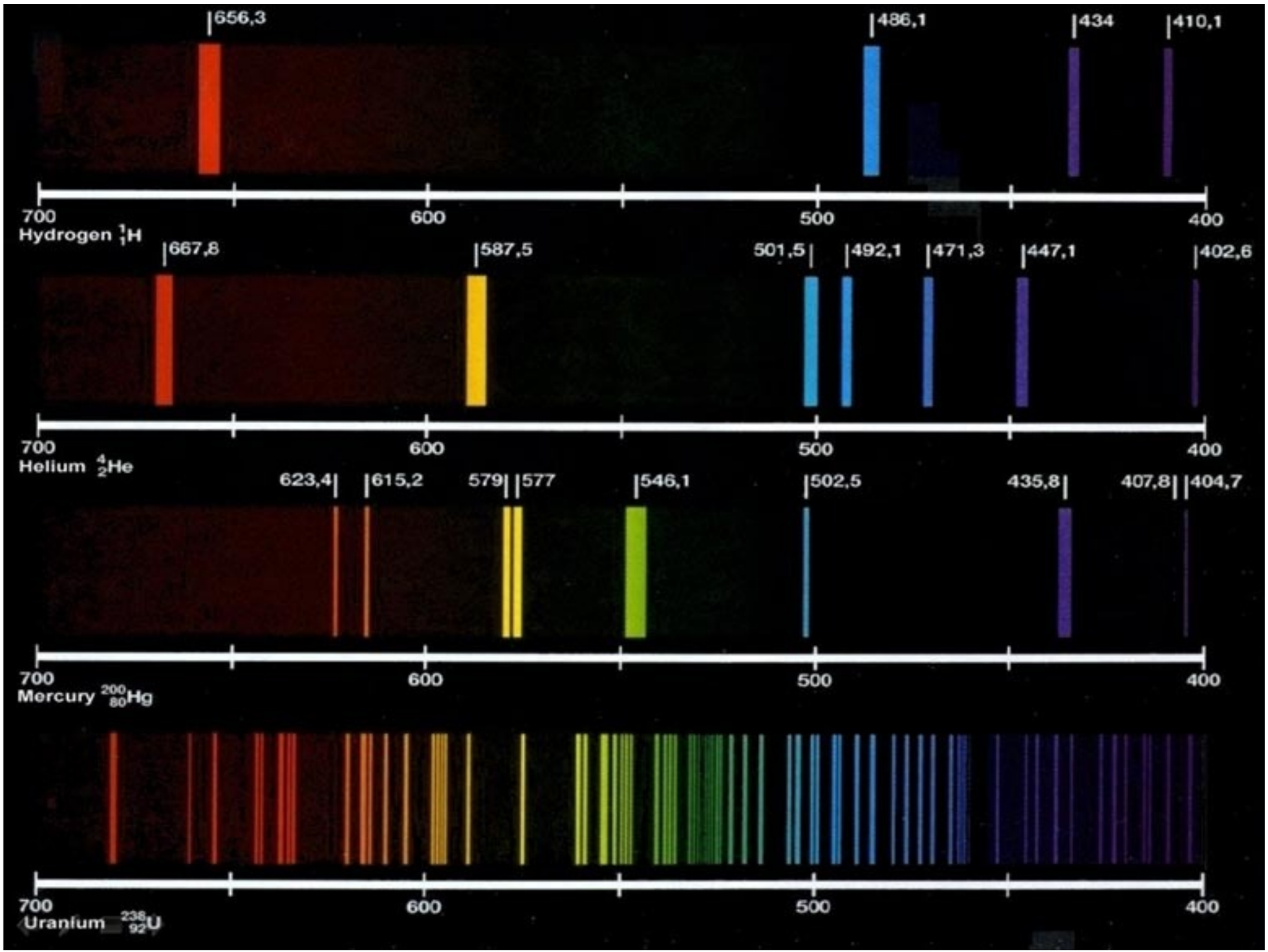
$$\lambda = 0{,}17\,nm$$

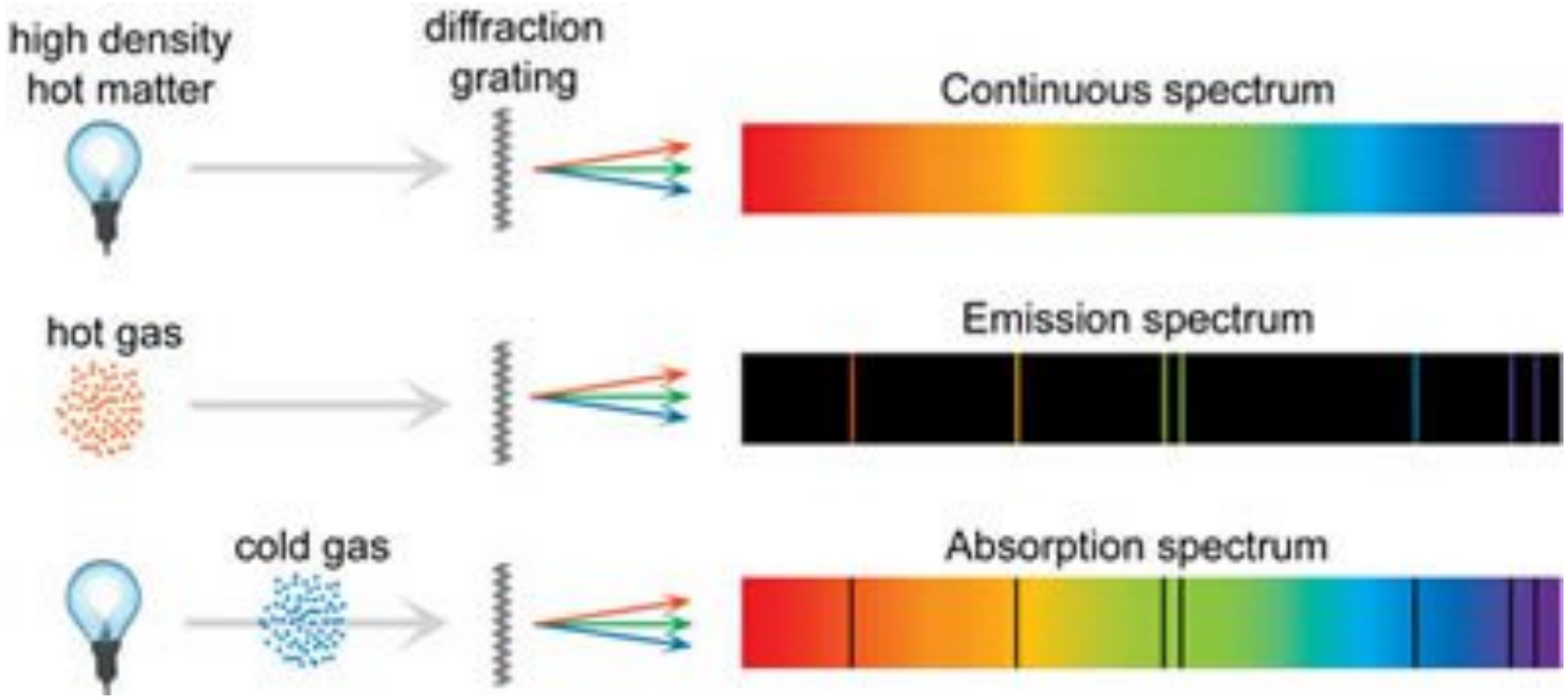

Several plane waves
Wave packet
Δx

Vezana stanja

Lokaliziran delec ima <u>diskreten</u> spekter (lestvica stanj).

To je kvantizacija energije.

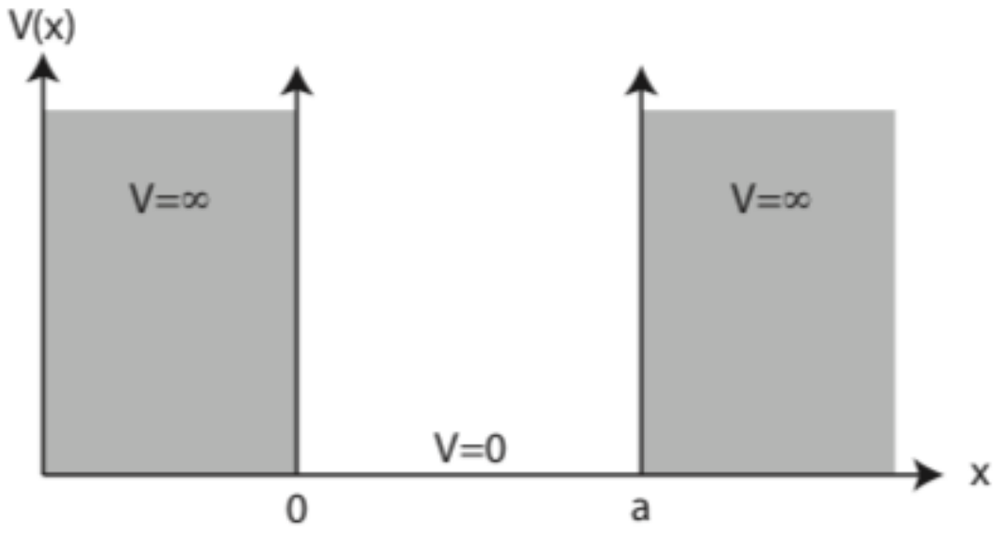


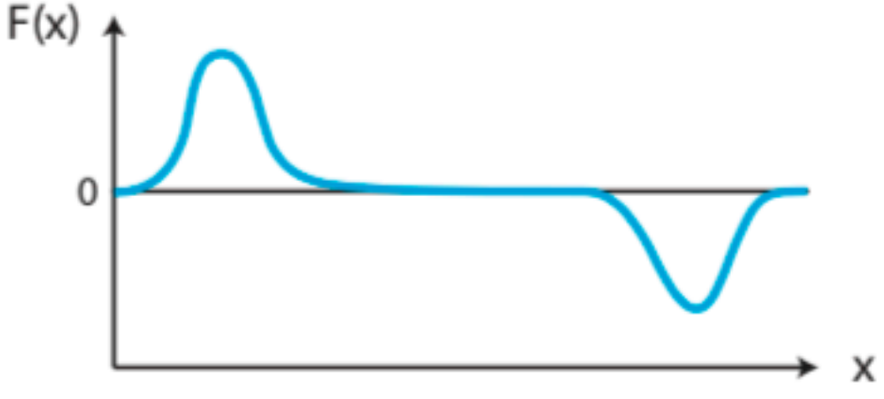

high density
hot matter
diffraction
grating
Continuous spectrum
hot gas
Emission spectrum
cold gas
Absorption spectrum

"Electron in a box"

idealizacija

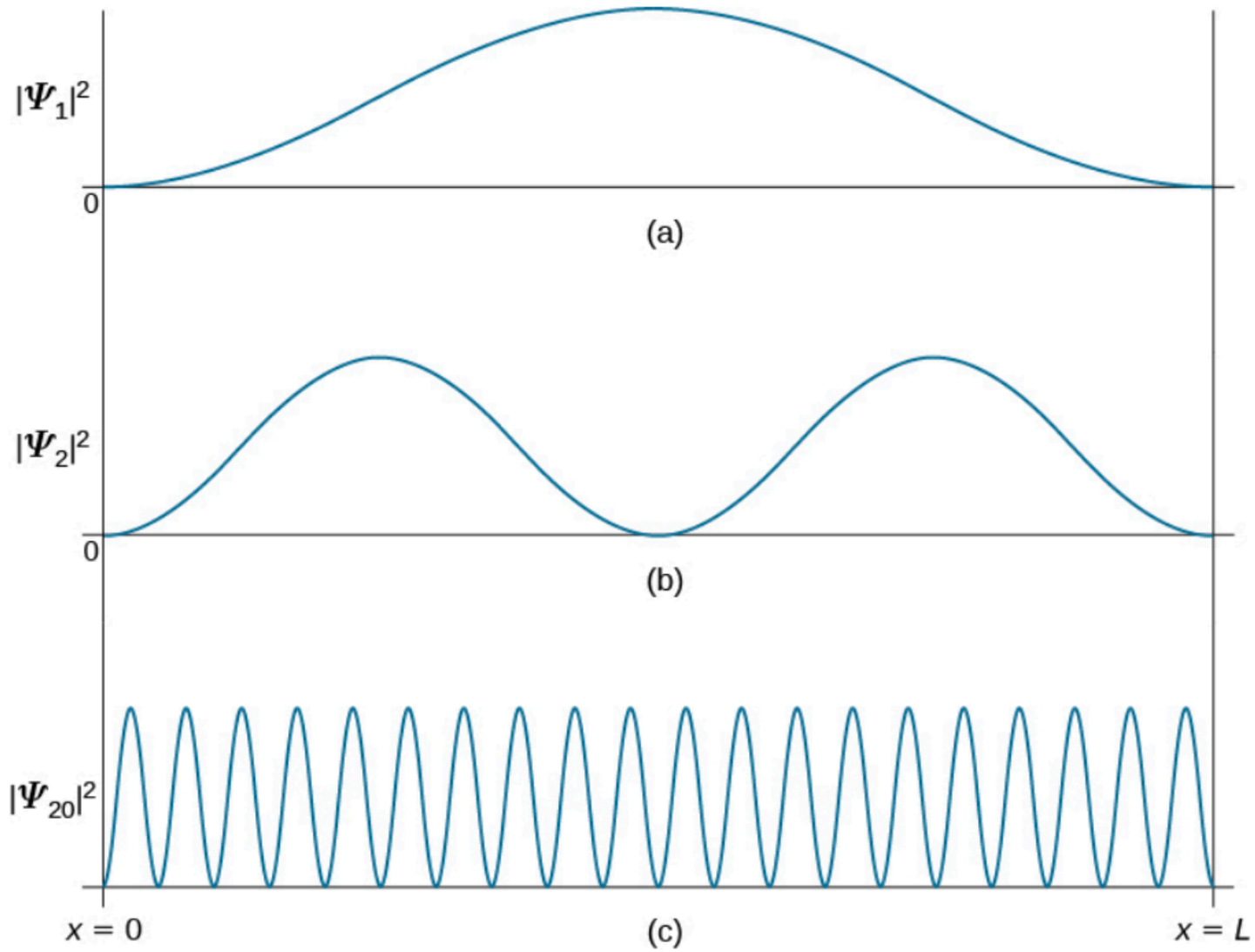
realni potencial





sile

Klasična limita (velik n):

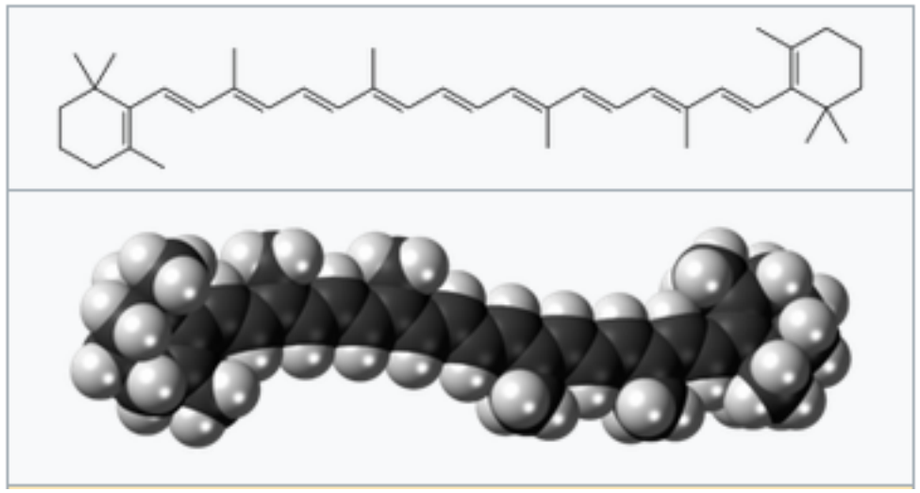


$$m = 0,4\,kg$$

$$v = 0,5\,m/s$$

$$n \approx 10^{33}$$

β-Carotene



$$\Delta E = \frac{(n_f^2 - n_i^2)h^2}{8mL^2}$$

$$\lambda = \frac{hc}{\Delta E}$$

$$\Delta E = \frac{(n_f^2 - n_i^2)h^2}{8mL^2}$$

$$= \frac{(12^2 - 11^2)h^2}{8mL^2}$$

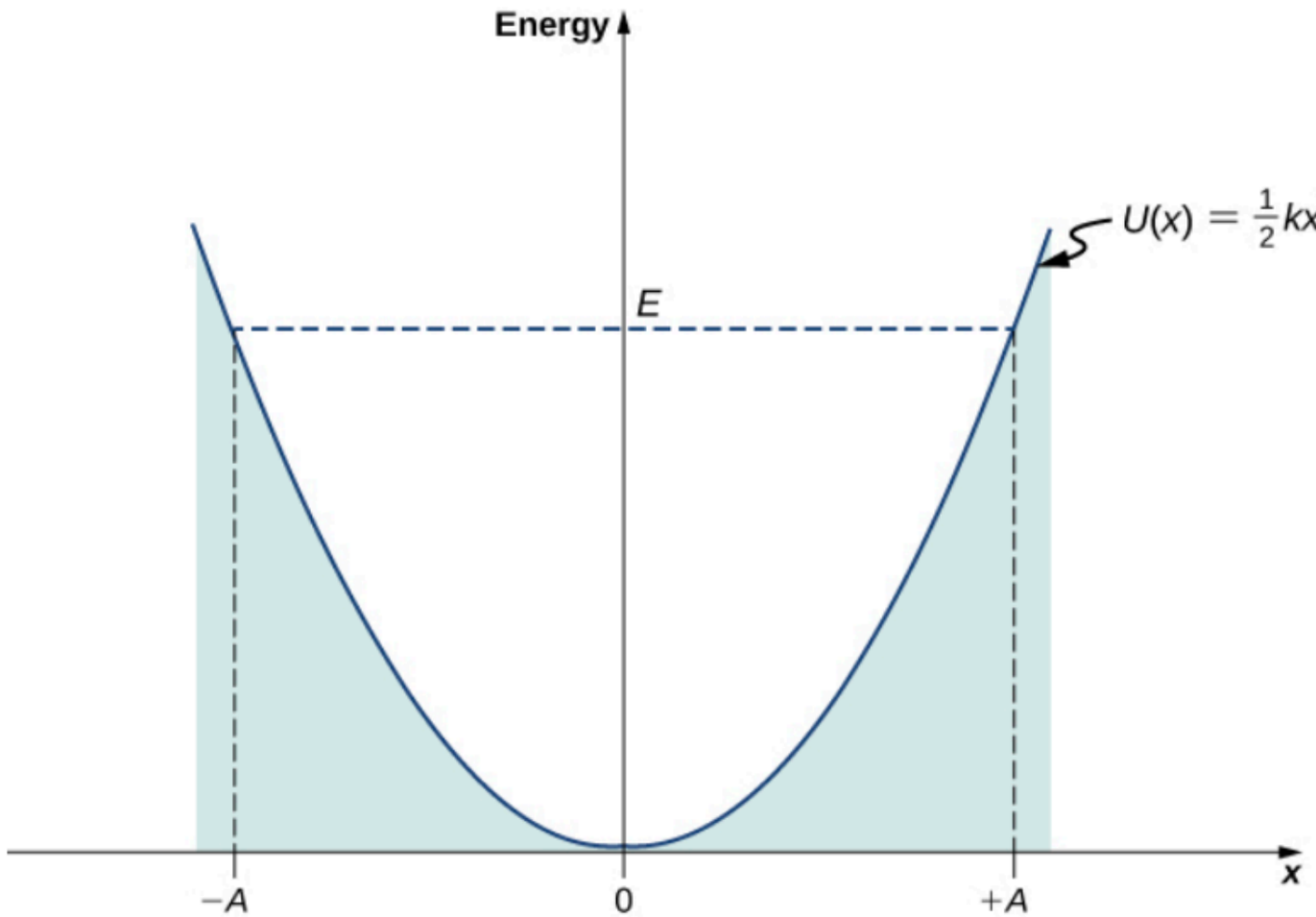
$$= 2.3658 \times 10^{-19}\ \text{J}$$

$$\lambda = \tfrac{hc}{\Delta E}$$

$$= 0.00000084\ \text{m} = 840\ \text{nm}$$

ENERGIJSKI SPEKTER KVANTNEGA HARMONIČNEGA NIHALA

$$V = \frac{1}{2}kx^2 = \frac{1}{2}m\omega_0^2 x^2$$



$$-\frac{\hbar^2}{2m}\frac{\mathrm{d}^2\phi(x)}{\mathrm{d}x^2} + \frac{1}{2}m\omega_0^2 x^2\phi(x) = E\phi(x)$$

Brezdimenzijske spremeljivke

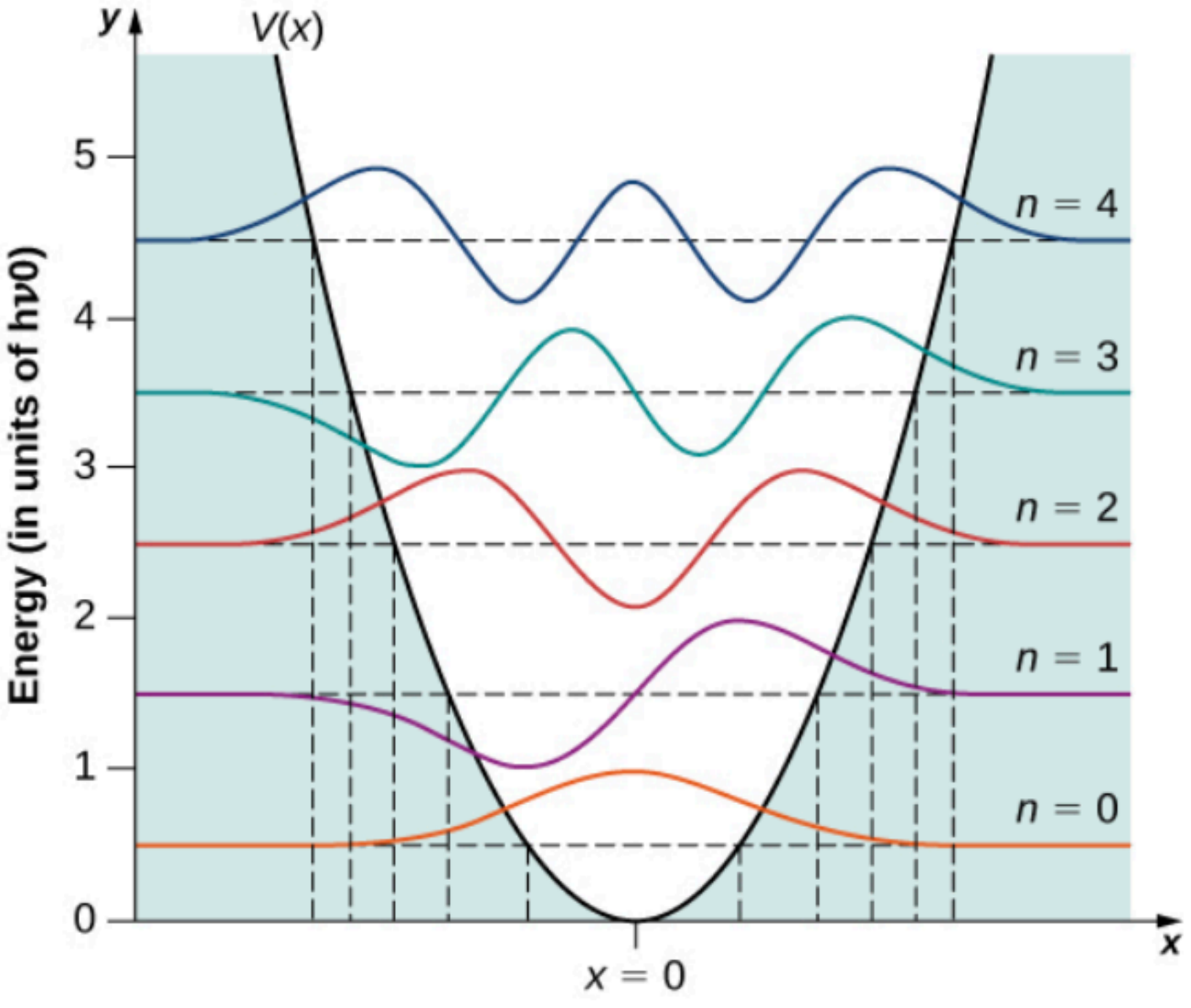
$$\xi = \sqrt{\frac{m\omega_0}{\hbar}}x \qquad \epsilon = \frac{2E}{\hbar\omega_0} \qquad \frac{d^2\phi}{d\xi^2} - \xi^2\phi + \epsilon\phi = 0$$

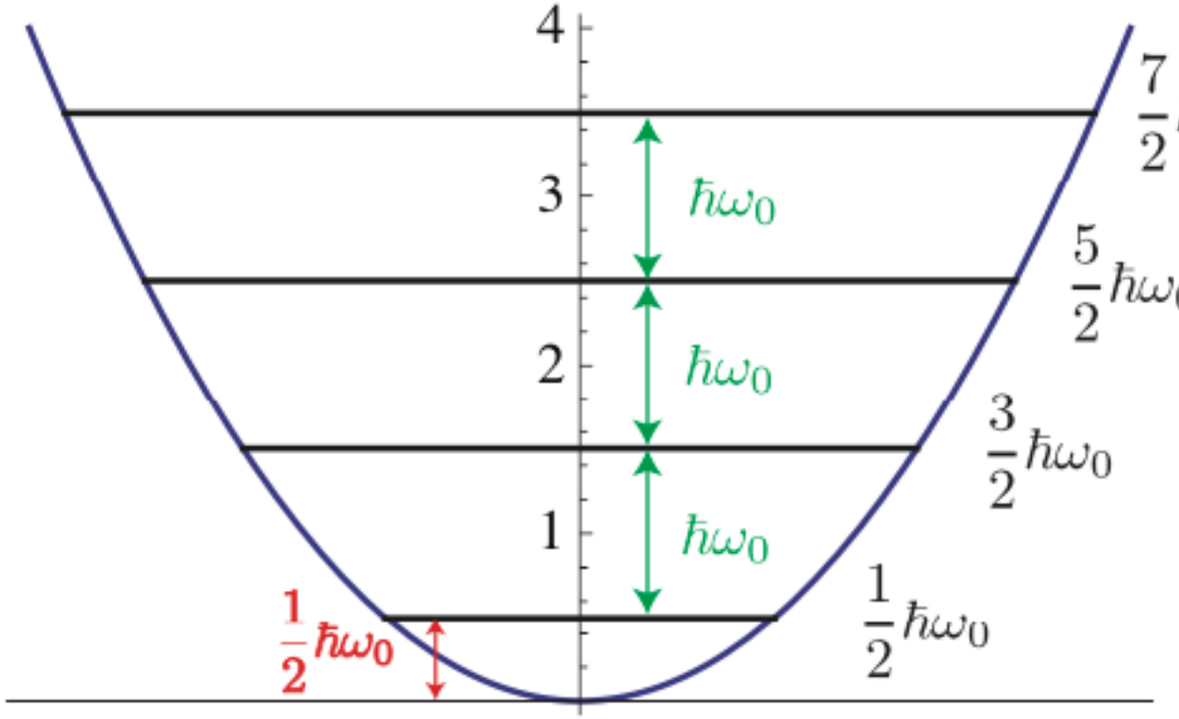
$$\xi \text{ velik } \rightarrow \quad \frac{d^2\phi}{d\xi^2} - \xi^2\phi \approx 0 \qquad \phi \approx e^{-\xi^2/2}$$

$$\phi_n(\xi) = A e^{-\xi^2/2} H_n(\xi)$$

$$A = \frac{1}{\sqrt{2^n n!}} \pi^{-1/4}$$

$$H_0(x) = 0, \quad H_1(x) = 2x, \quad H_2(x) = 4x^2 - 2$$





$$E_n = \hbar\omega_0 \left(n + \frac{1}{2} \right)$$

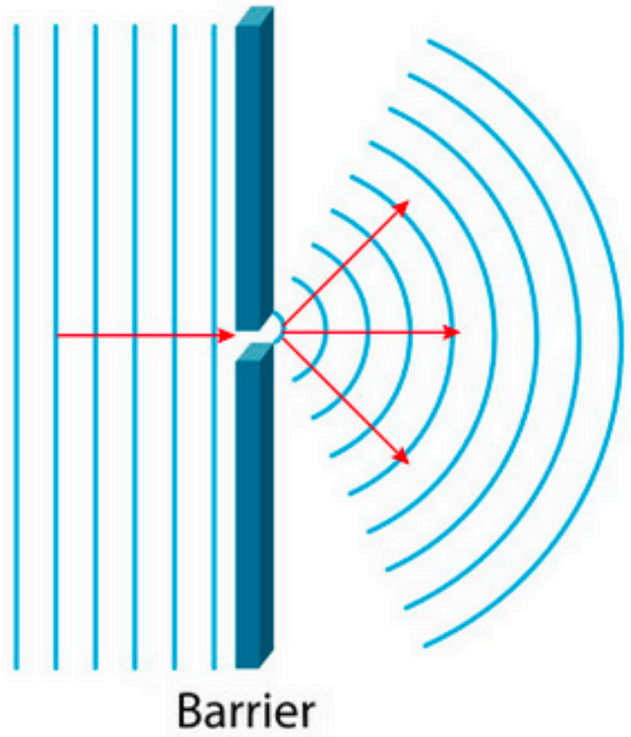
↑

ničelna energija!

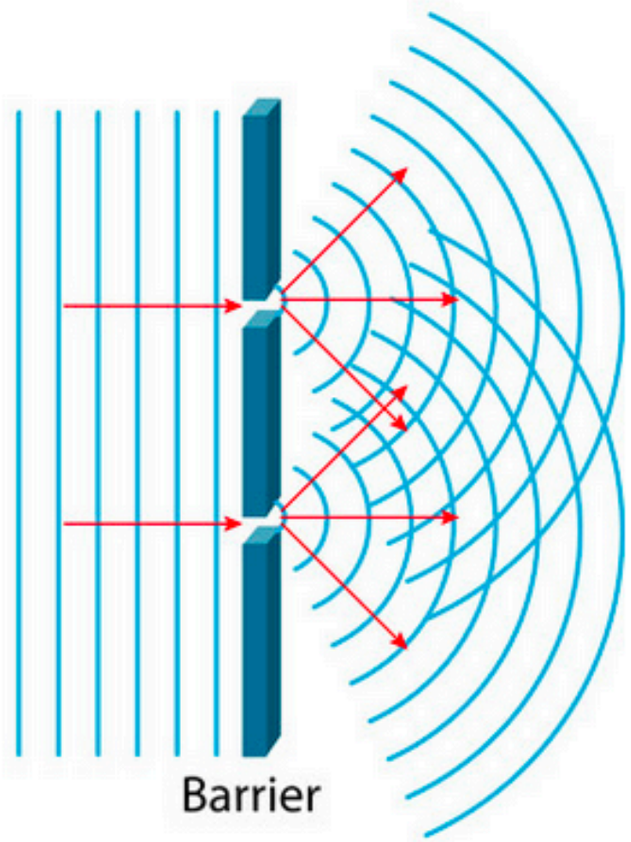
DIFFRACTION OF WAVES

UKLON VALOVANJ

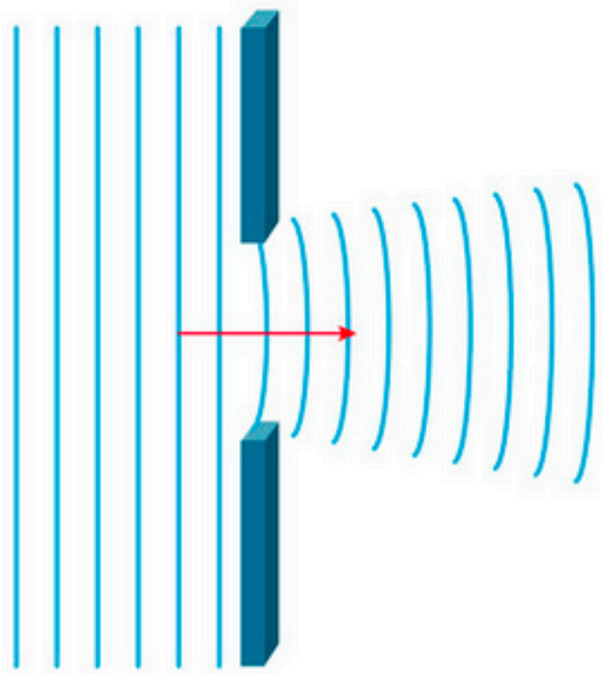
Wave impinges on a narrow slit



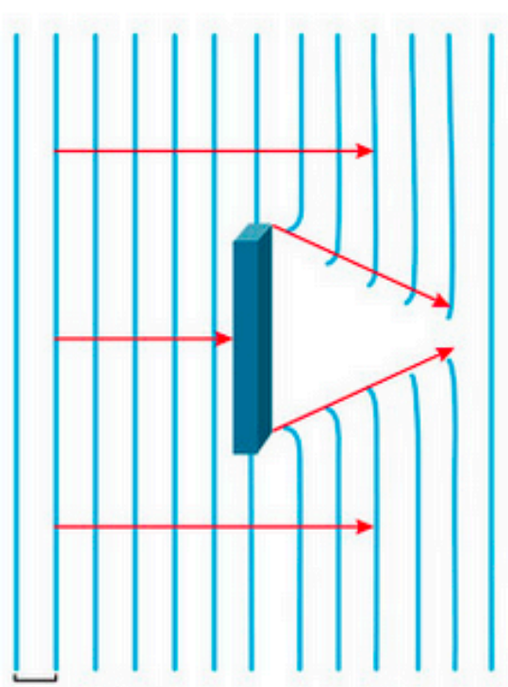
Wave interference

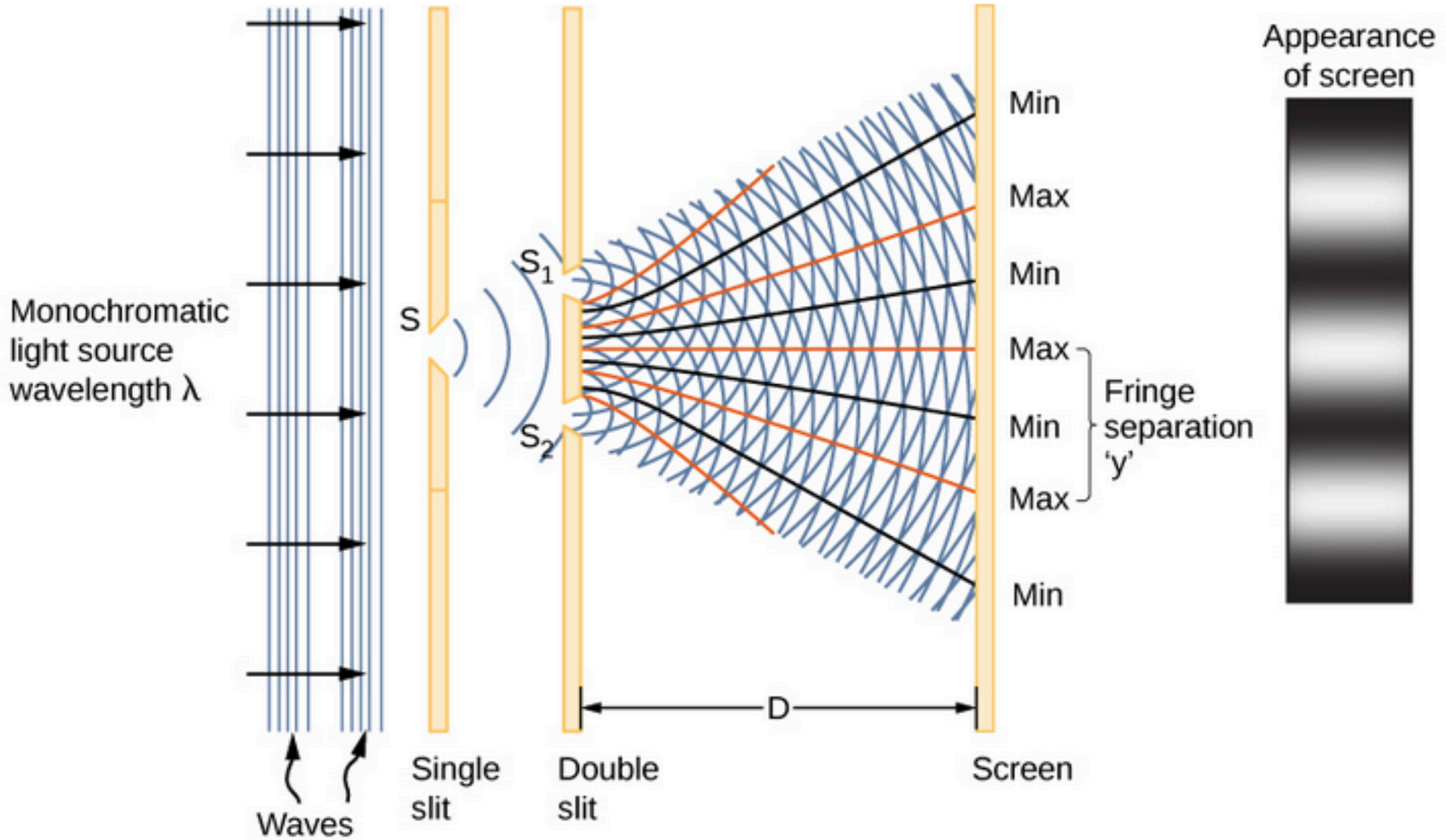
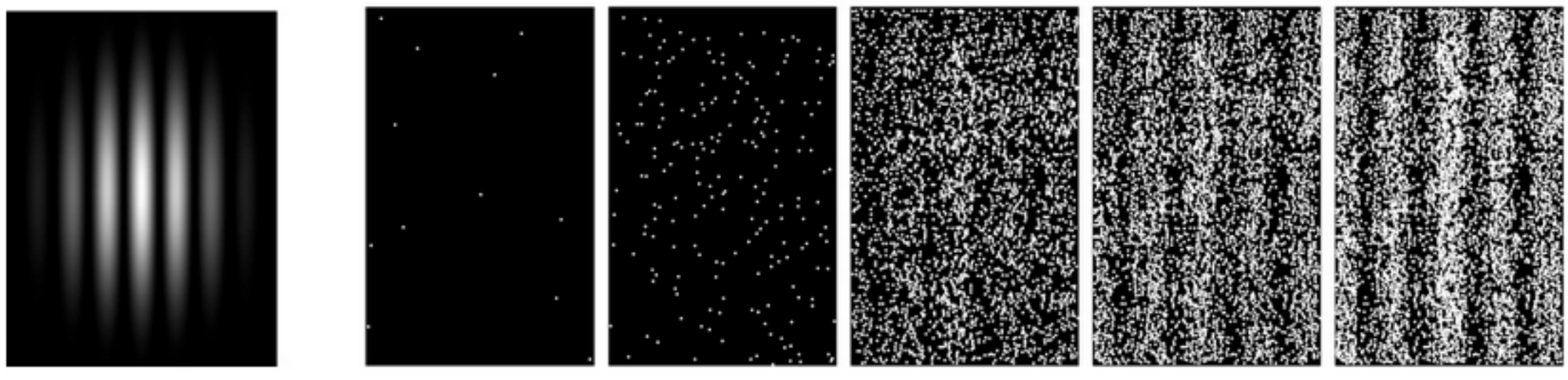


Wave impinges on a broad slit



Barrier is longer than the wavelength




Monochromatic
light source
wavelength λ
S
S1
S2
Min
Max
Min
Max
Min
Max
Fringe
separation
'y'
Min
D
Waves
Single
slit
Double
slit
Screen
Appearance
of screen