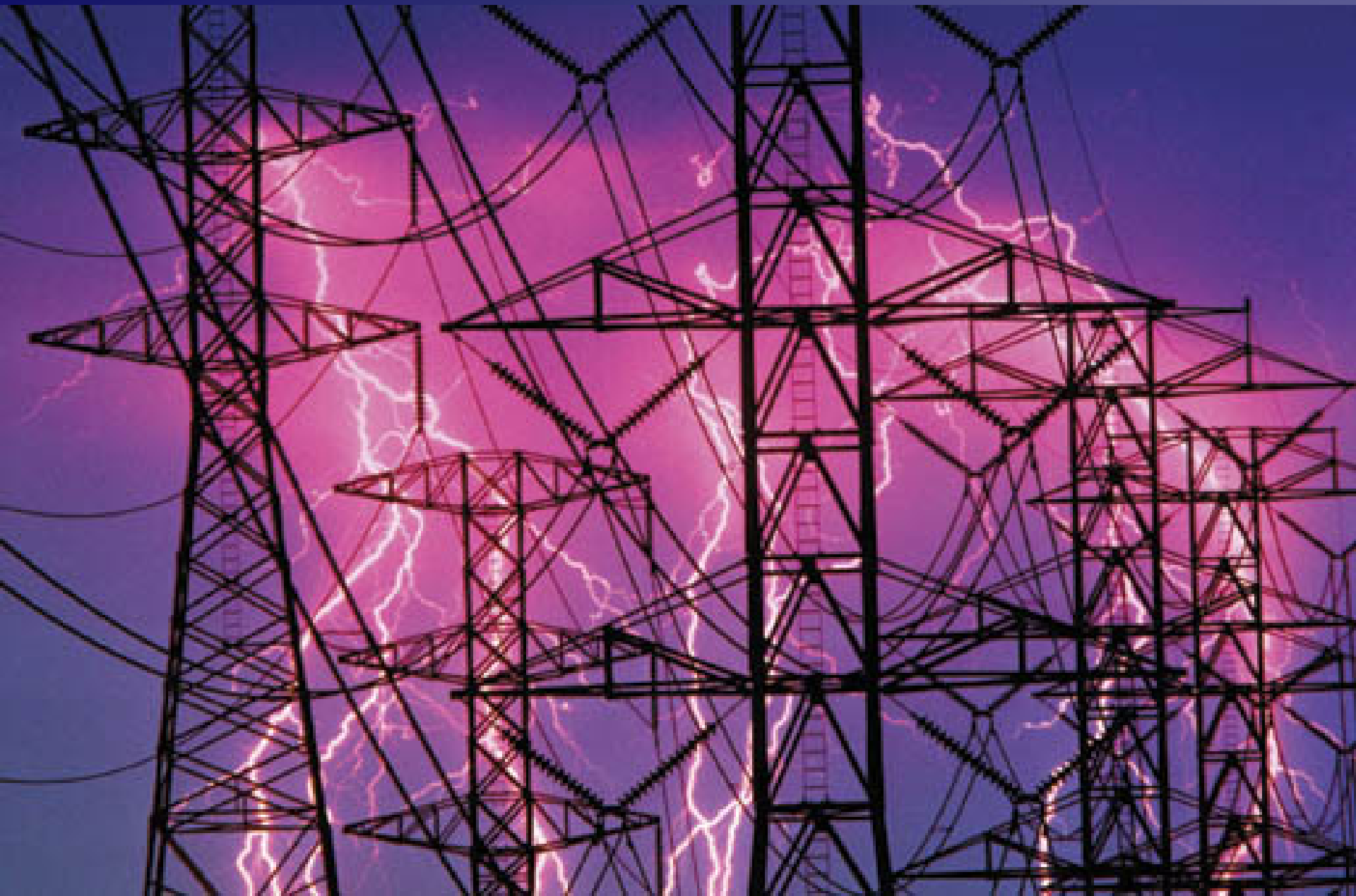
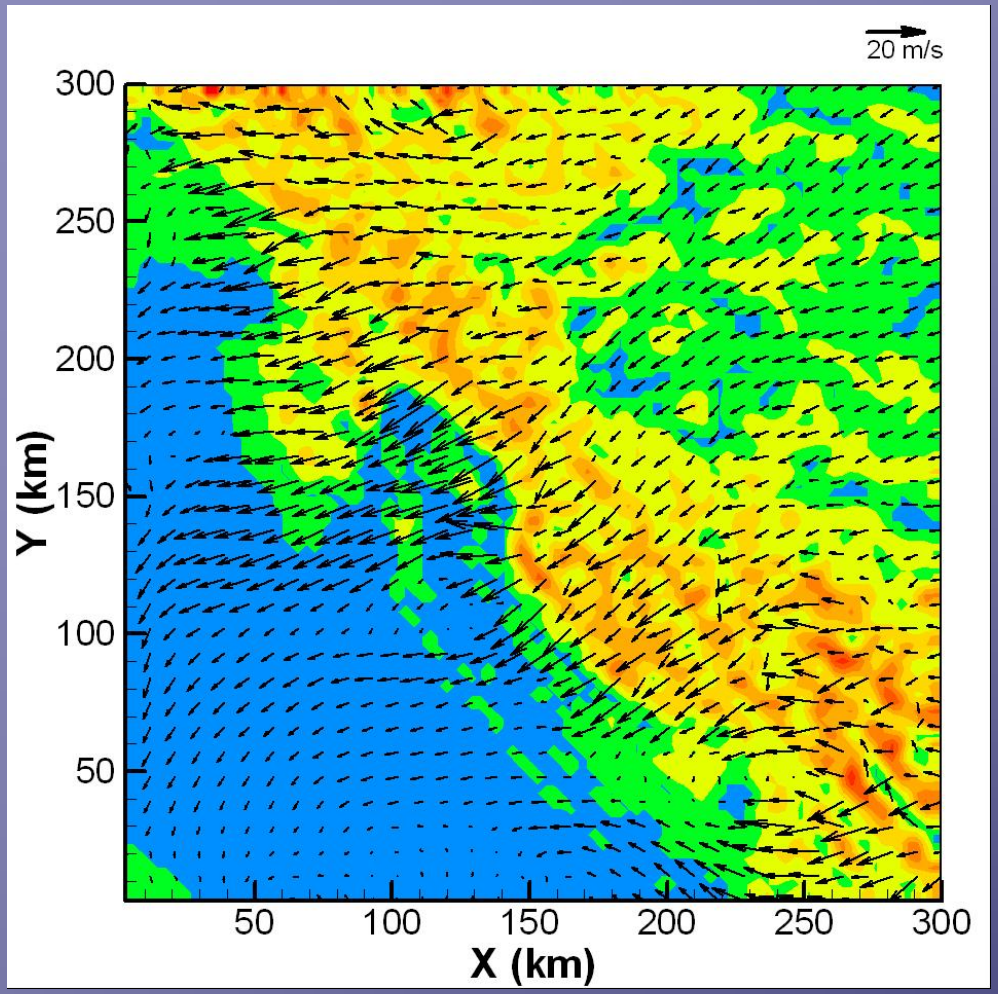
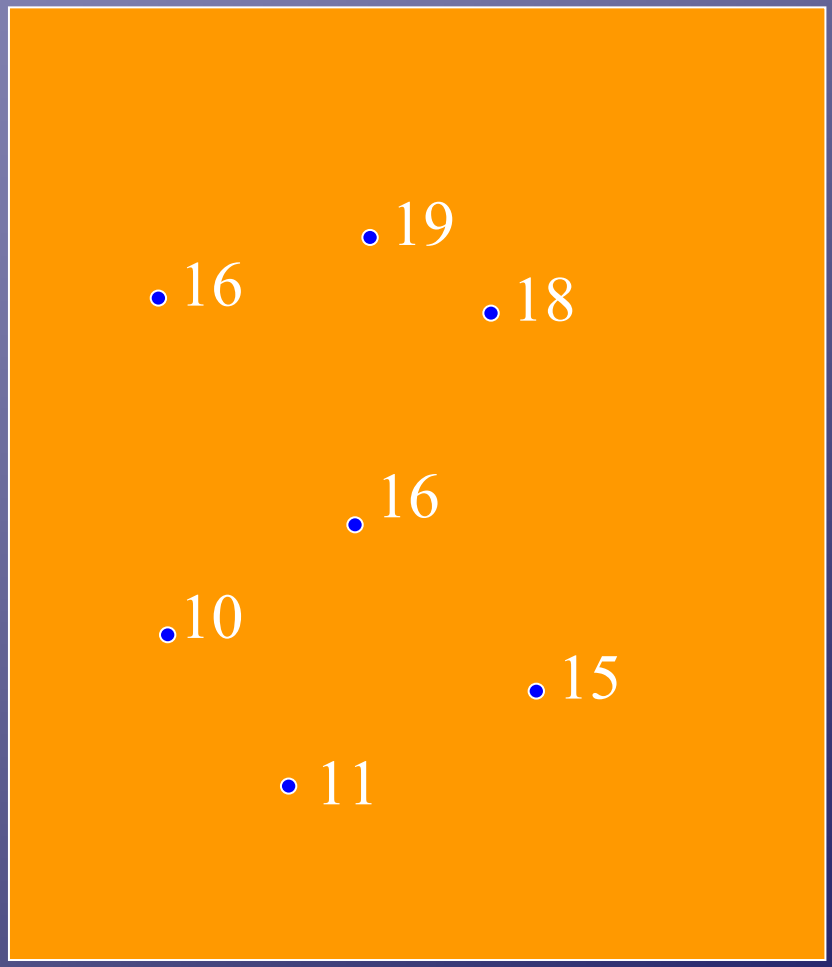
ELEKTRIČNI POTENCIJAL



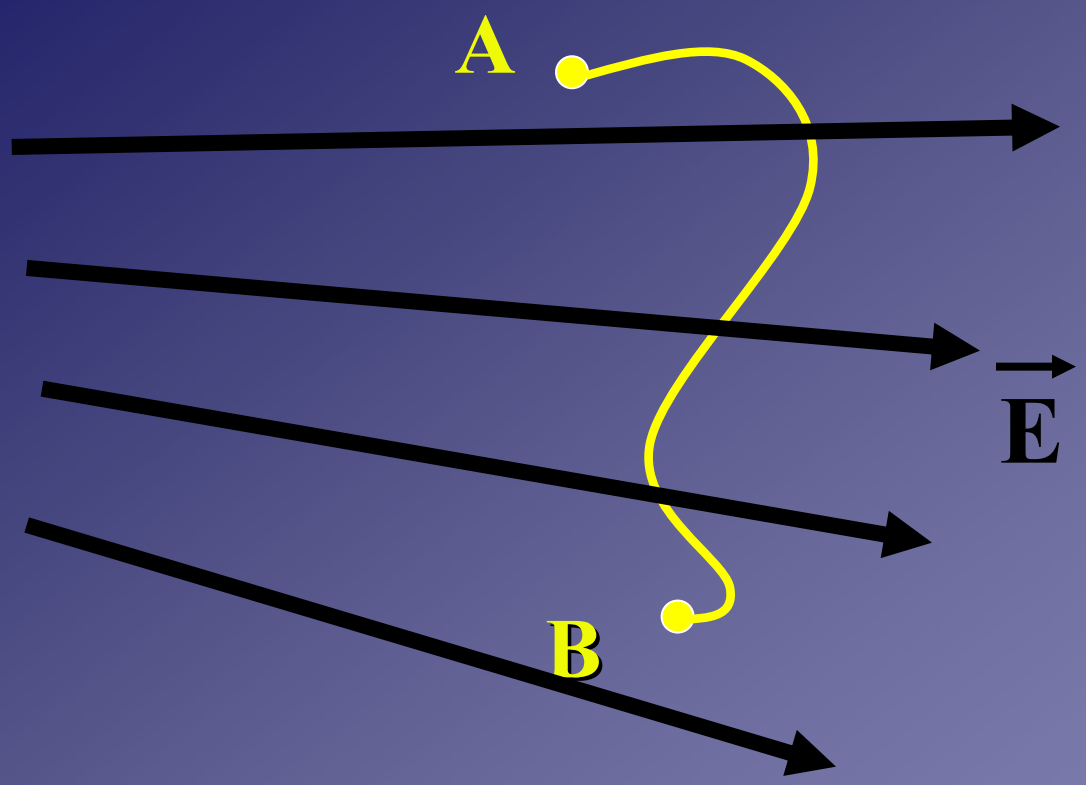


Vektorsko polje



Skalarno polje

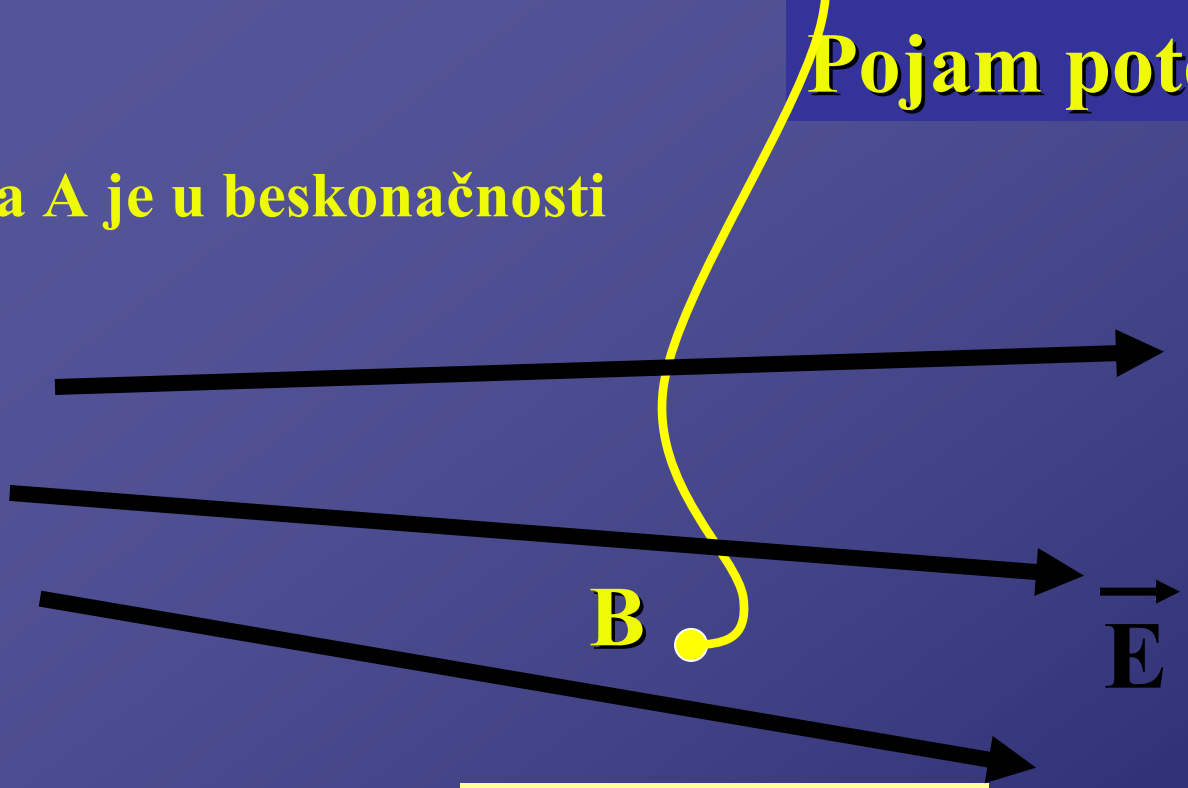
Električni potencijal- definicija



Razlika potencijala $U_B - U_A = \frac{W_{AB}}{q_o}$

Pojam potencijala u točki

Točka A je u beskonačnosti



$$U_B - U_A = \frac{W_{AB}}{q_o}$$

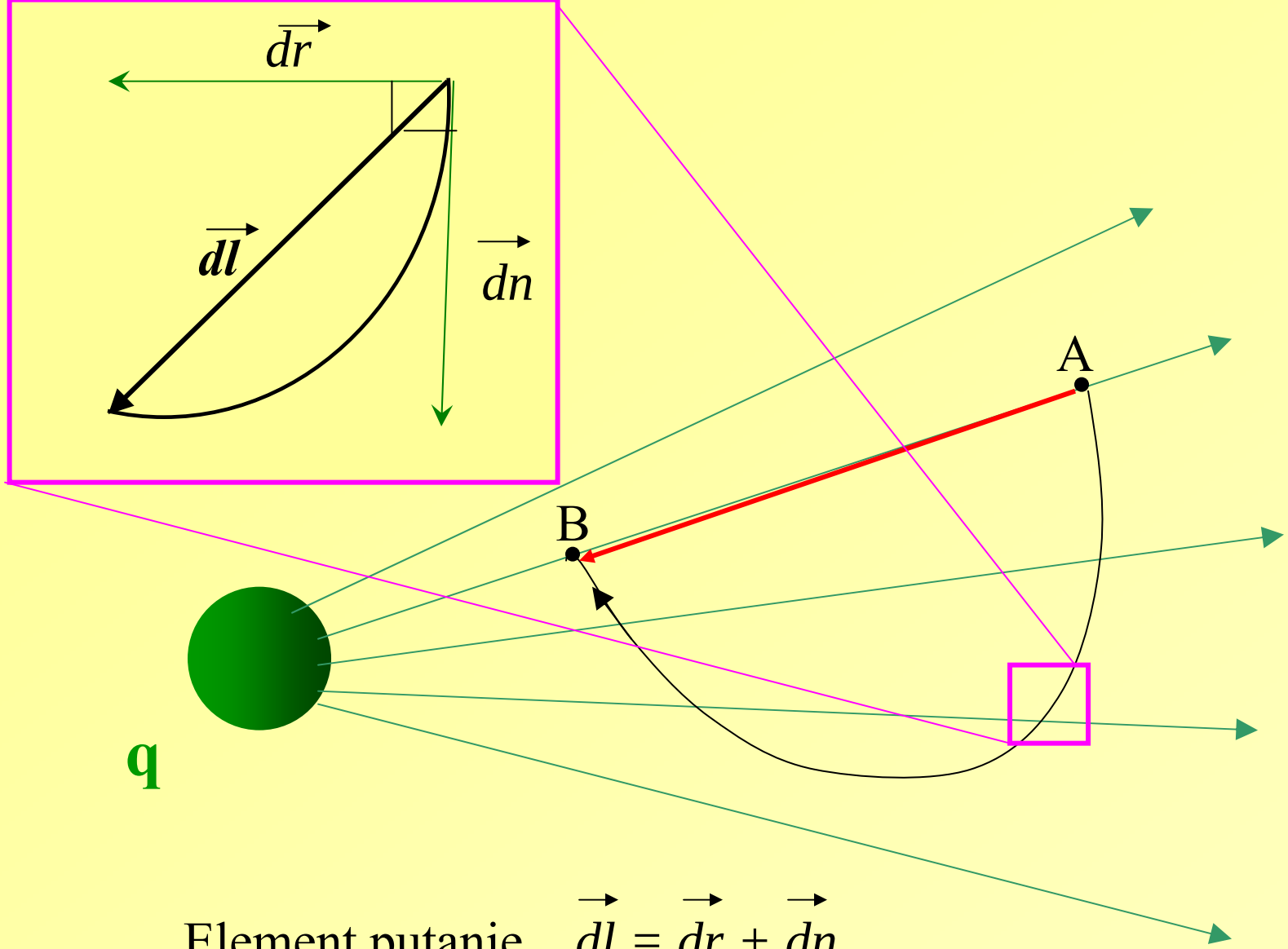
$W_{\infty B}$

Izbor: 0

$$U_B = \frac{W_{\infty B}}{q_o}$$

odnosno

$$U_T = \frac{W_{\infty T}}{q}$$

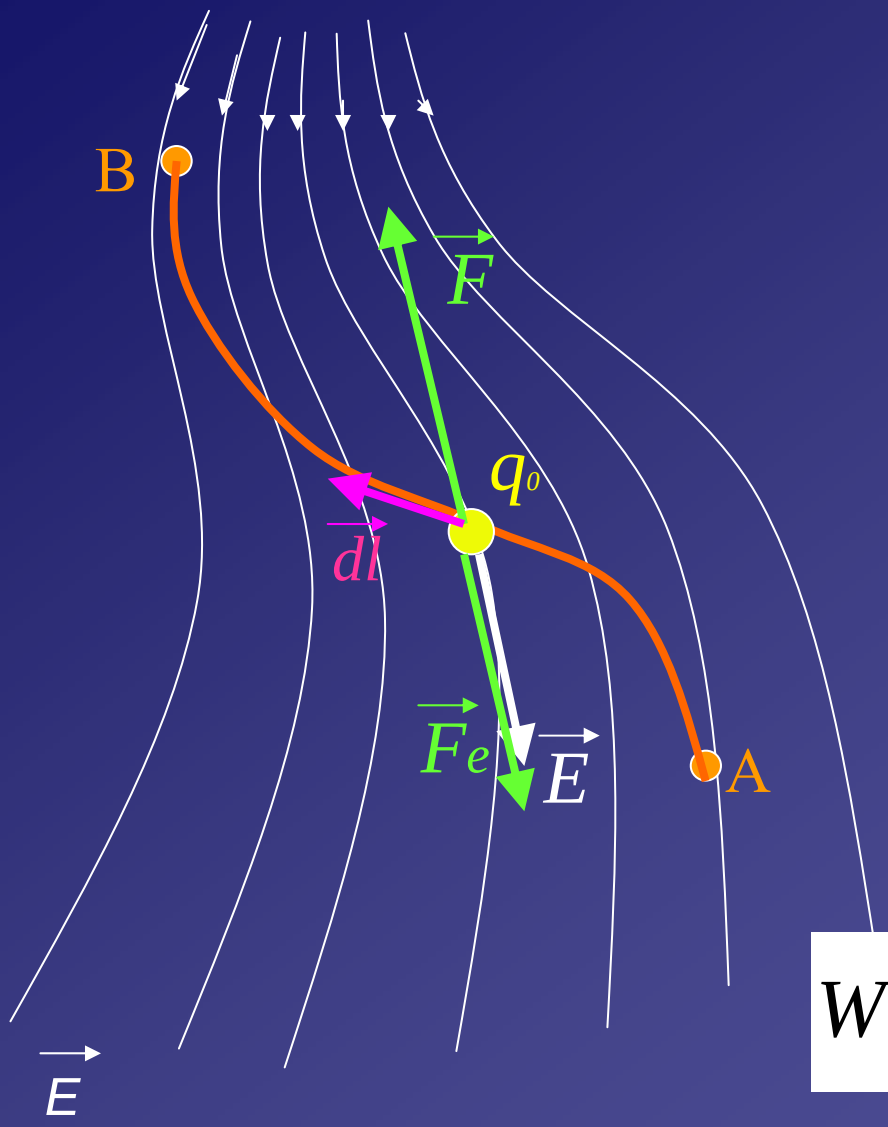


Element putanje $\vec{dl} = \vec{dr} + \vec{dn}$

Diferencijal rada $dW = \vec{F}\vec{dl} = \vec{F}\vec{dr} + \vec{F}\vec{dn}$

Iščezava jer cos 90 = 0

Električno polje i potencijal



$q_0 : A \longrightarrow B$

$\vec{F}_e = \vec{E}\, q_0$ električna sila

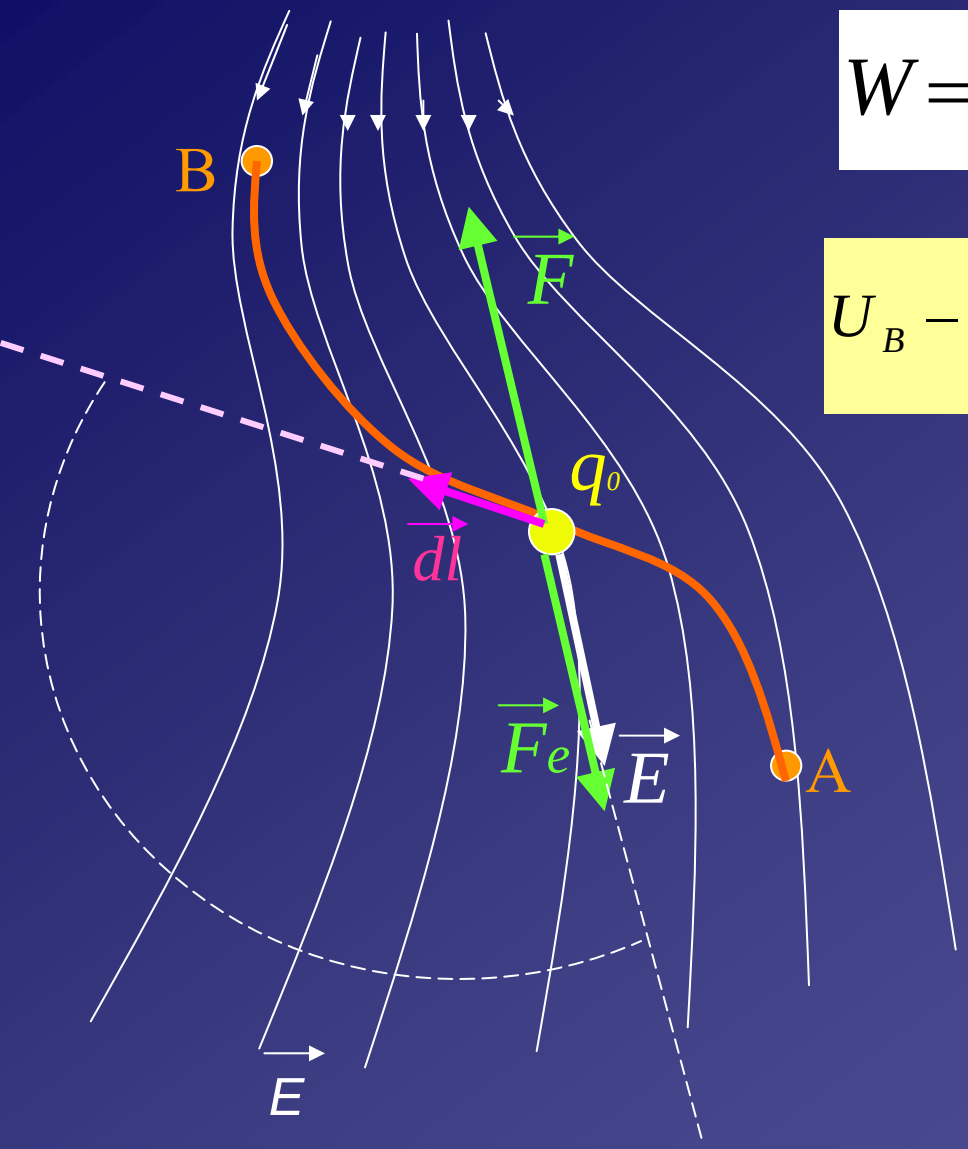
$\vec{F} = -\vec{F}_e = -\vec{E}\, q_0$

$$dW = \vec{F}\,\vec{dl}$$

$$W = \int \vec{F}\,\vec{dl}$$

$$W = -\int q_0 \vec{E}\,\vec{dl} = -q_0 \int \vec{E}\,\vec{dl}$$

Električno polje i potencijal



$$W = -q_0 \int \vec{E}\vec{dl}$$

$$U_B - U_A = \frac{W_{AB}}{q_0}$$

$$U_B - U_A = \frac{-q_0 \int_A^B \vec{E}\vec{dl}}{q_0}$$

$$U_B - U_A = -\int_A^B \vec{E}\vec{dl}$$

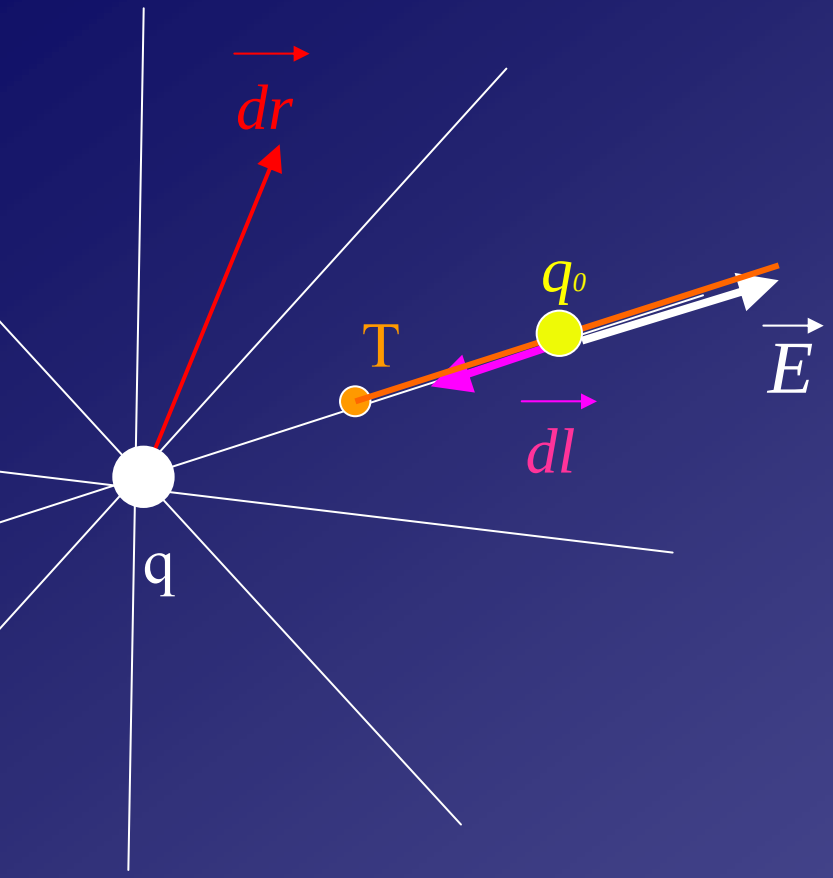
Električno polje i potencijal

$$U_B - U_A = -\int_A^B \vec{E}\,\vec{dl}$$

za $A \to \infty$ i izbor $U_A = 0$

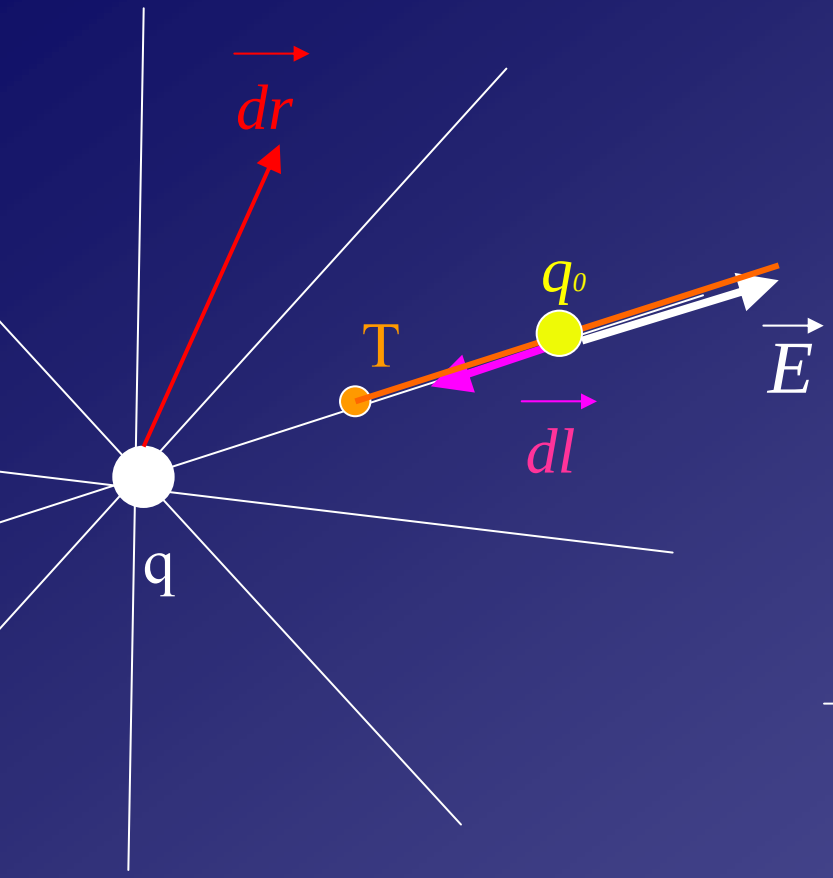
$$U_B = -\int_\infty^B \vec{E}\,\vec{dl}$$

Potencijal točkastog naboja



$$U_T = -\int_{\infty}^{T} \vec{E}\,\vec{dl}$$

Potencijal točkastog naboja



$$U_T = -\int_{\infty}^{T} \vec{E}\,\vec{dl}$$

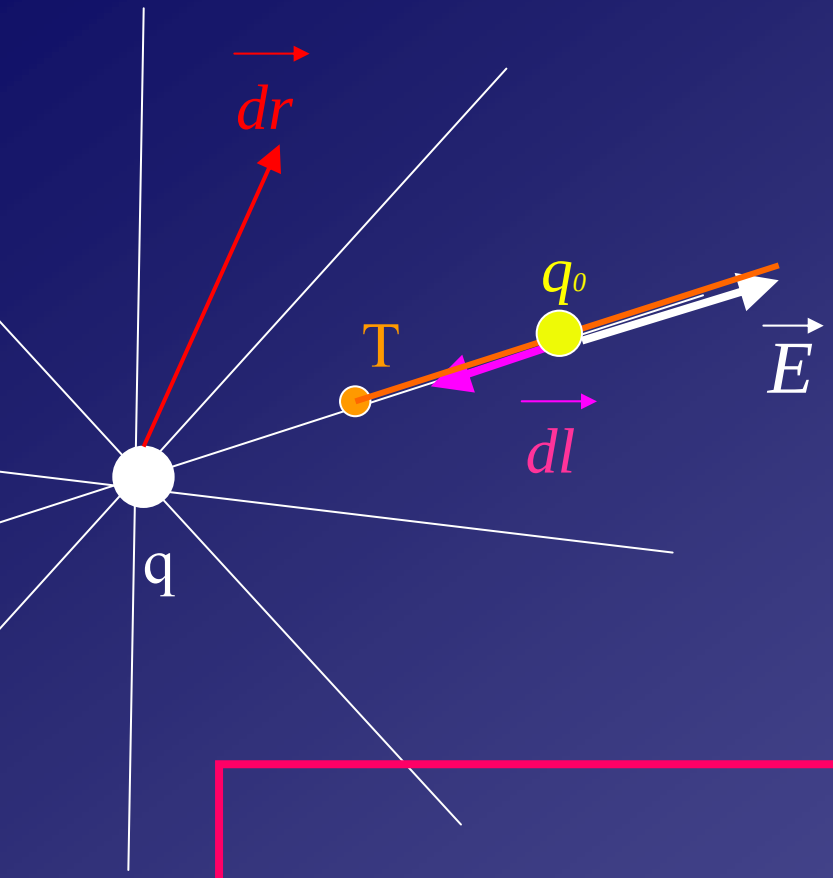
$$dr = -\,dl$$

$$\vec{E}\,\vec{dl} = E\,dl\cos(180^o) = -E\,dl$$

$$\vec{E}\,\vec{dl} = E\,dr$$

$$U_T = -\int_{\infty}^{T} \vec{E}\,\vec{dl} = -\int_{\infty}^{T} E\,dr$$

Potencijal točkastog naboja



$$U_T = -\int_{\infty}^{T} E dr$$

$$U_T = -\int_{\infty}^{T} K_e \frac{q}{r^2} dr$$

$$U_T = -K_e q \left(-\frac{1}{r} \right) \Bigg|$$

$$U_T = K_e q \left(\frac{1}{r_T} - \frac{1}{\infty} \right) \Bigg|$$

Potencijal točkastog naboja

$$U_T = K_e \frac{q}{r_T}$$

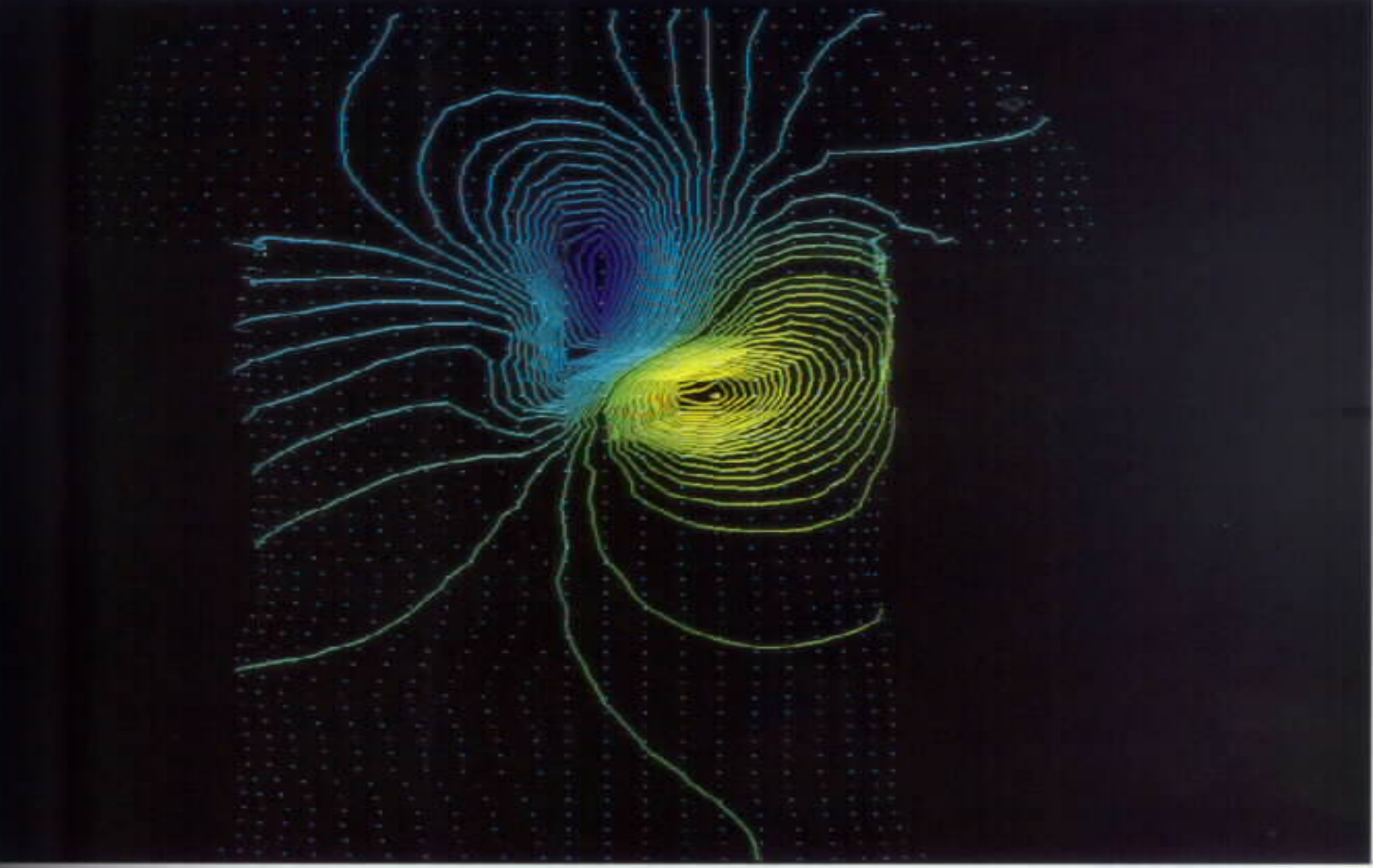
Potencijal točkastog naboja

$$U_T = K_e \frac{q}{r_T}$$

Što su ekvipotencijalne plohe?

Potencijal skupa točkastih naboja

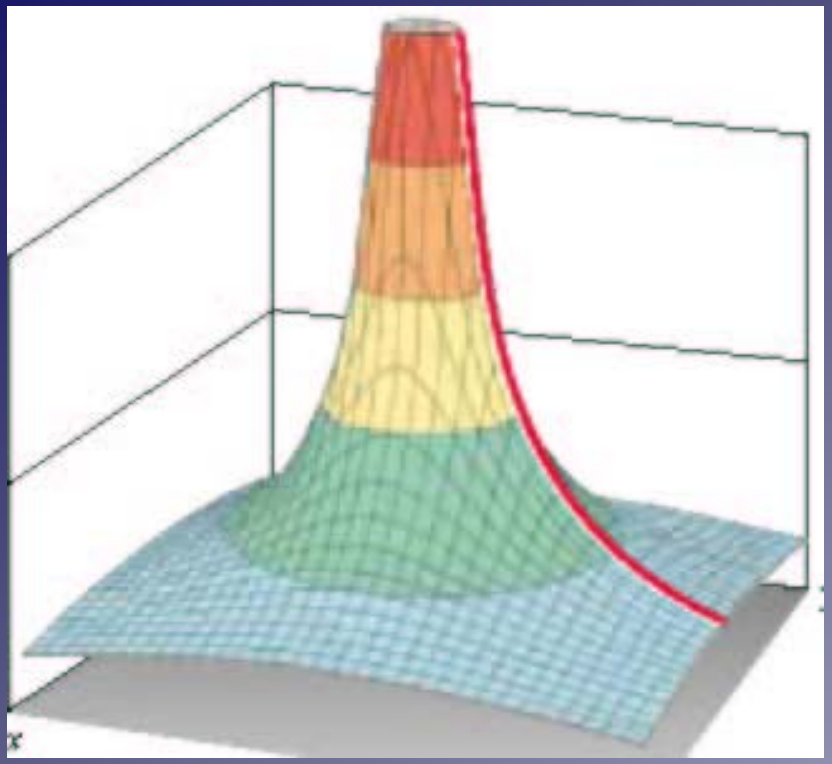
Potencijal električnog dipola



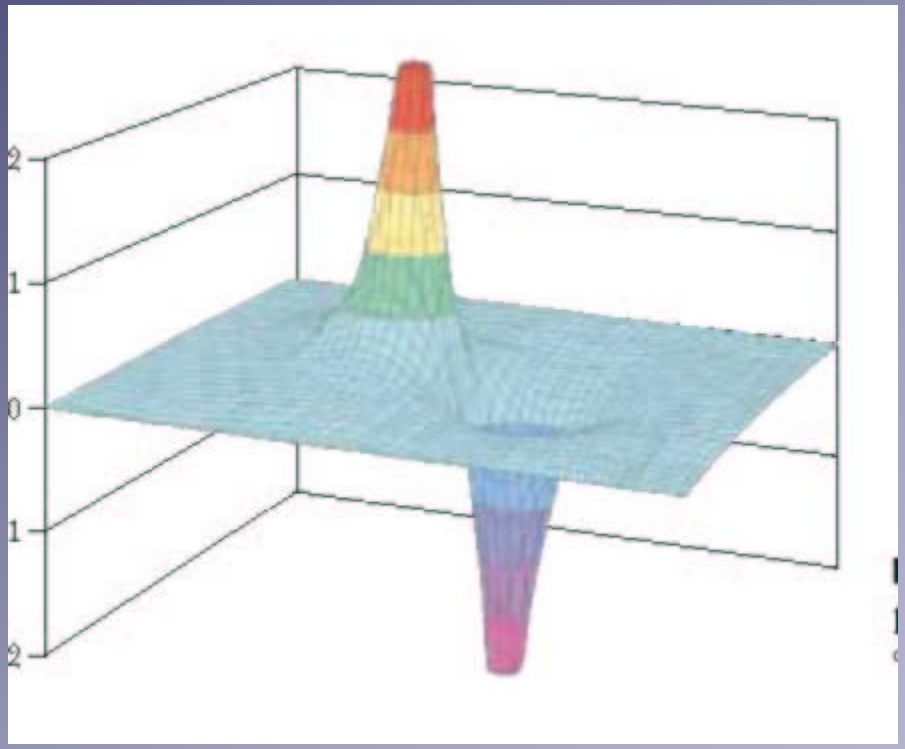
Lines of constant electric potential surround the human heart, suggesting that it behaves like an electric dipole. Electric potential and electric dipoles are discussed in this chapter.

Ovisnost električnog polja i potencijala o udaljenosti r

	E= f(r)	**U=f(r)**
Monopol točkast naboj	$E = K_e \frac{q}{r^2}$	$U = K_e \frac{q}{r}$
Dipol	$E = K_e \frac{p}{r^3}$	$U = K_e \frac{p \cos\theta}{r^2}$
Multipoli	druge relacije	druge relacije



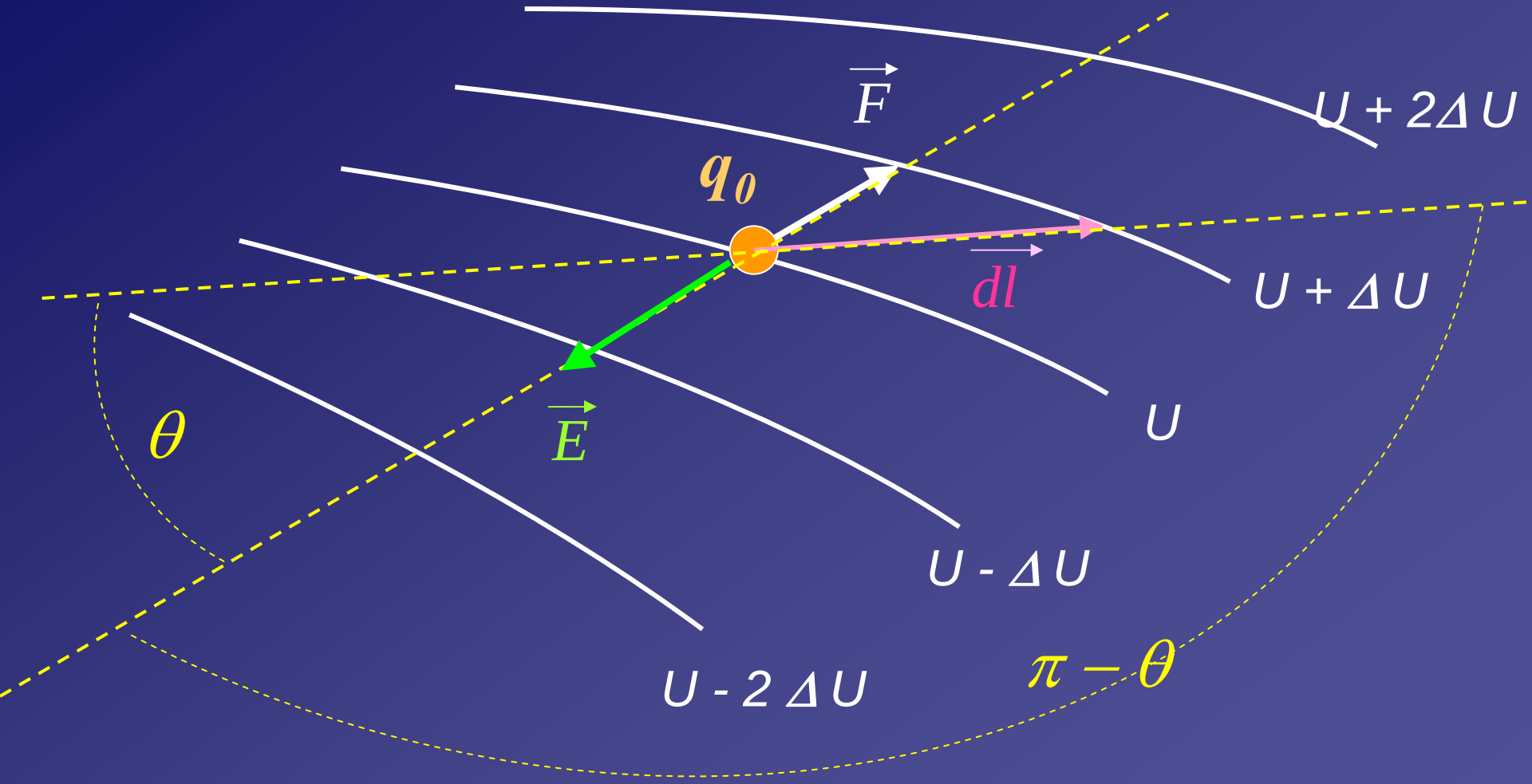
Potencijal monopola



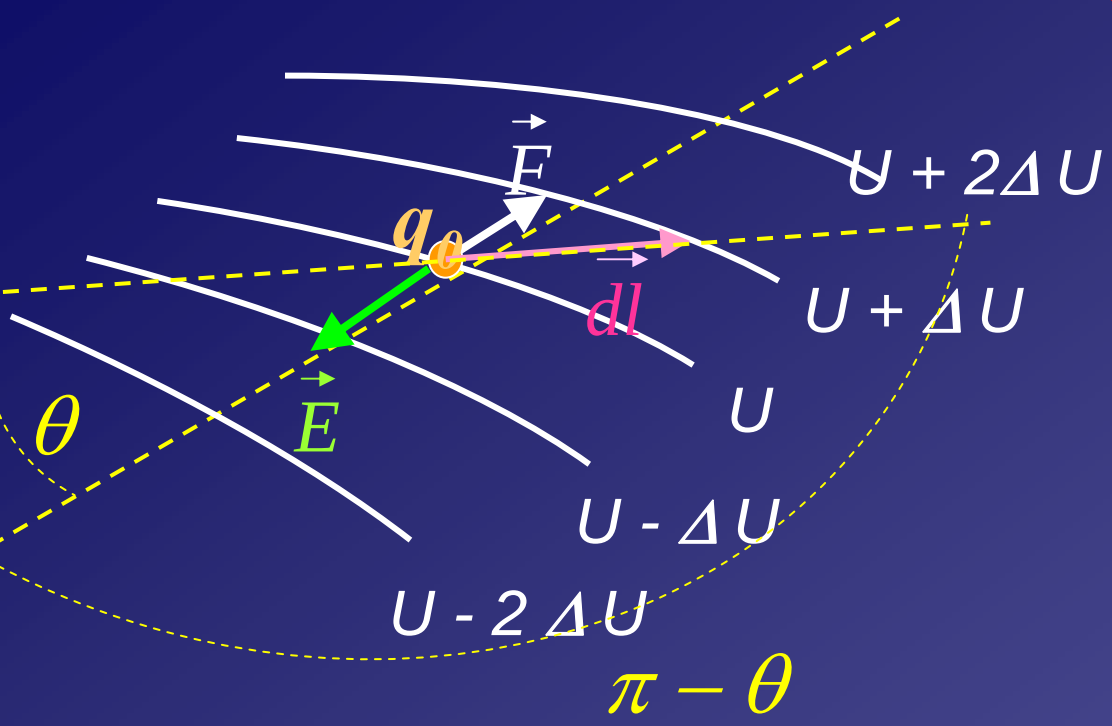
Potencijal dipola

Serway R.A., Jewett J.W. Physics for scientists and engineers

Ovisnost električnog polja o potencijalu



Ovisnost električnog polja o potencijalu



$$U + \Delta U - U = \frac{\Delta W}{q_o}$$

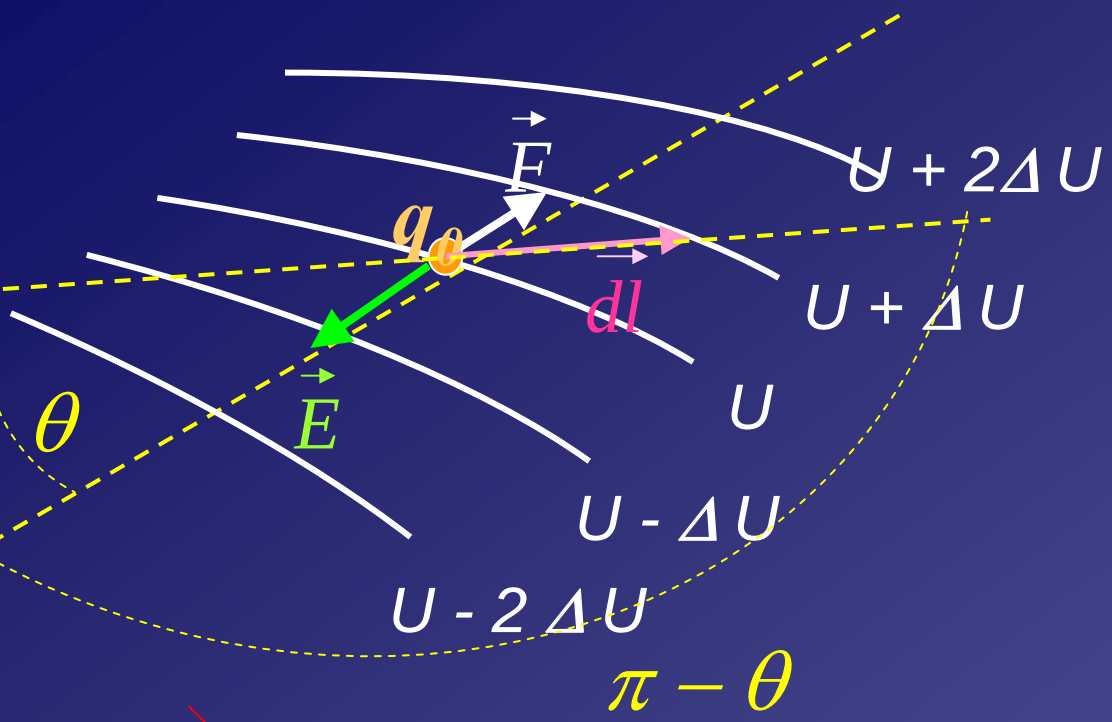
$$\Delta U = \frac{\Delta W}{q_o}$$

$$\Delta W = q_0 \Delta U$$

$$\Delta W = \vec{F} \cdot \vec{\Delta l} = -q_0 E \cdot \Delta l \cdot \cos(\pi - \theta)$$

$$= q_0 E \cdot \Delta l \cdot \cos\theta$$

Ovisnost električnog polja o potencijalu



$$\Delta W = q_0 \Delta U = q_0 E \cdot \Delta l \cdot \cos\theta \longrightarrow E\cos\theta = \frac{\Delta U}{\Delta l}$$

komponenta polja u smjeru -l

E_l

Električno polje i potencijal

$$E_l = -\frac{dU}{dl}$$

Komponenta polja u smjeru puta jednaka je negativnoj promjeni potencijala duž puta. (E se pruža u smjeru opadanja U)

Električno polje i potencijal

$$U_B - U_A = -\int_A^B \vec{E}\,\vec{dl} \qquad dU = -\int_A^B \vec{E}\,\vec{dl}$$

$$E_l = -\frac{dU}{dl}$$

Elektrostatska potencijalna energija