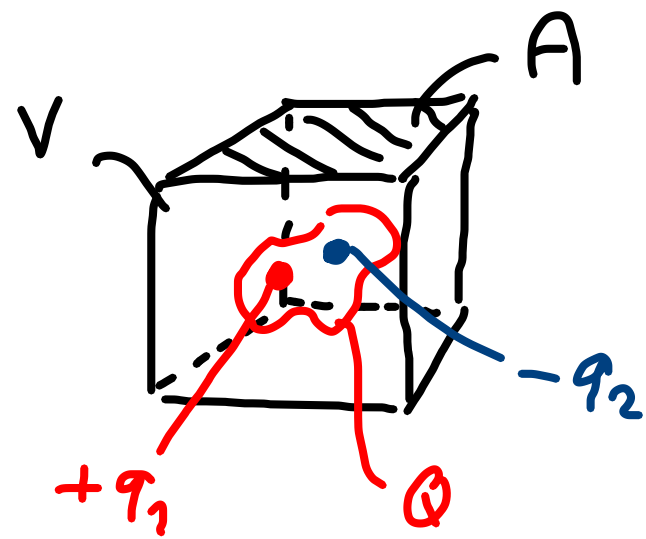


Physics hour 02

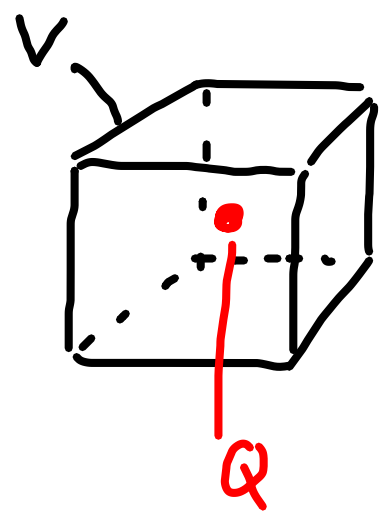
1) Elektrischer Fluss I



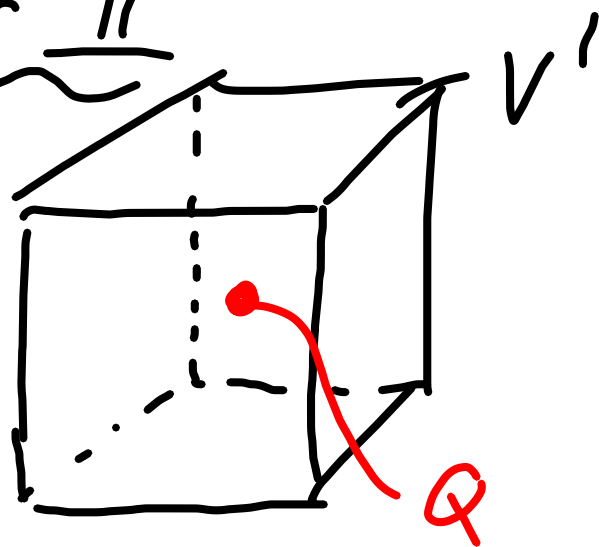
Satz von Gauß: $\Phi = \frac{Q}{\epsilon_0} = \frac{+q_1 - q_2}{\epsilon_0} \rightarrow \frac{2q_1 - 2q_2}{\epsilon_0} = \Phi'$

$$\Phi' = 2 \underbrace{\frac{q_1 - q_2}{\epsilon_0}}_{\Phi} = 2\Phi$$

2) Elektrischer Fluss II

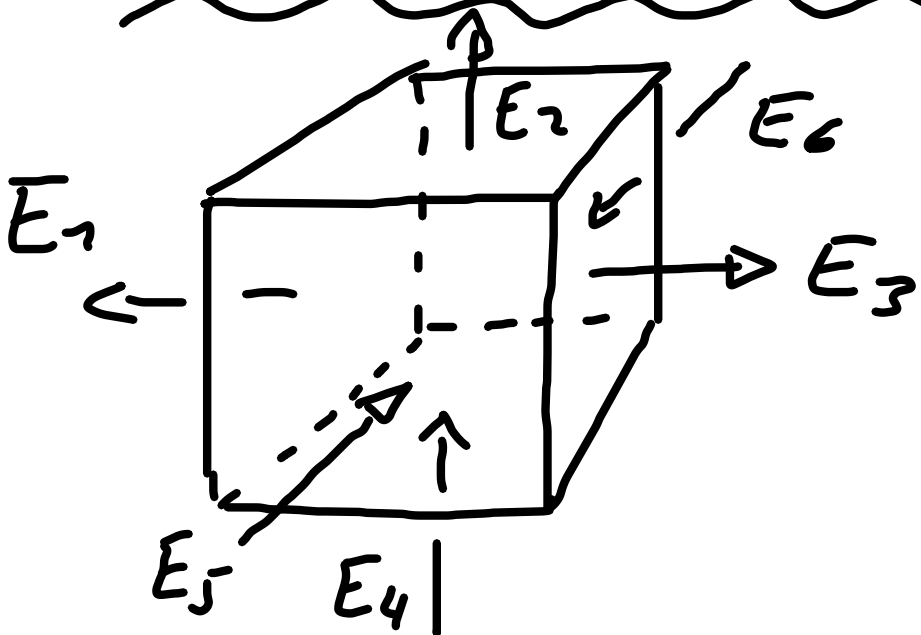


$$\Phi = \frac{Q}{\epsilon_0}$$



$$\Phi' = \frac{Q}{\epsilon_0} = \Phi$$

3) Elektrischer Fluss III



$$\begin{aligned}
 \Phi &= \Phi_1 + \Phi_2 + \Phi_3 + \Phi_4 + \Phi_5 + \Phi_6 \\
 &= E_1 \cdot A + E_2 \cdot A + E_3 \cdot A + E_4 \cdot A + E_5 \cdot A + E_6 \cdot A \\
 &= A \cdot (E_1 + E_2 + E_3 + E_4 + E_5 + E_6) \\
 &= (0,1\text{m})^2 \cdot 4,5 \frac{\text{V}}{\text{m}} = 4,5 \cdot 10^{-2} \text{ V}\cdot\text{m}
 \end{aligned}$$

$$Q = \epsilon_0 \cdot \Phi = 8,85 \cdot 10^{-12} \frac{\text{As}}{\text{Vm}} \cdot 4,5 \cdot 10^{-2} \text{ V}\cdot\text{m} = 4 \cdot 10^{-13} \text{ C}$$

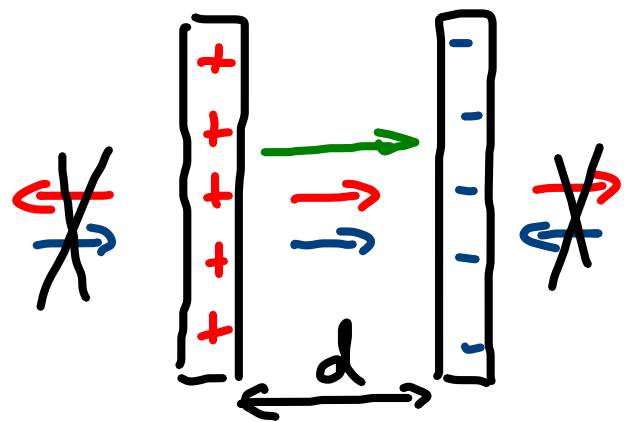
4) El. Feld einer Punktladung

c) ist falsch, korrekt: El. Potenzial $\varphi_{\text{el}} \sim \frac{1}{r}$

5) El. Feld eines geladenen Drahtes

E) ist falsch, korrekt: El. Feld $\sim$ Linienladungsdichte $\lambda = \frac{\text{Ladung}}{\text{Länge}}$

6) Plattenkondensator I



$$E = \frac{\sigma}{\epsilon_0} = \frac{Q}{\epsilon_0 A}$$

Korrekt: A) El. Feld außen = 0

C) El. Feld innen homogen

F) El. Feld innen unabh. von Plattenabstand d

G) El. Feld innen $\sim \frac{Q}{A}$

7) Plattenkondensator II

$$E = \frac{\sigma}{\epsilon_0} = \frac{Q}{\epsilon_0 A} = \frac{2 \cdot 10^{-9} \text{ C}}{8,85 \cdot 10^{-12} \frac{\text{As}}{\text{Vm}} \cdot 10^{-2} \text{ m}^2} = 22599 \frac{\text{V}}{\text{m}}$$

$$U = E \cdot d = 22599 \frac{\text{V}}{\text{m}} \cdot 10^{-2} \text{ m} = 226 \text{ V}$$