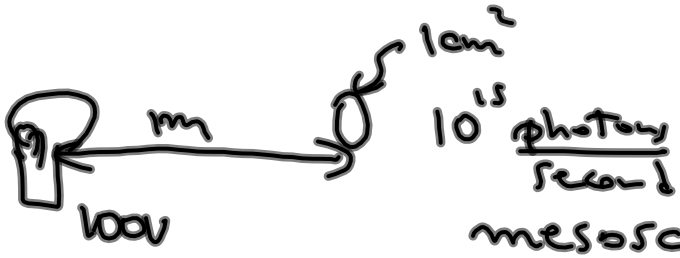
Intro to Jackson

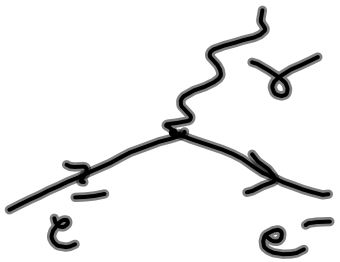
(1) large # of photons

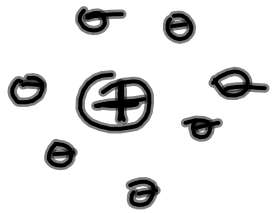


$I = 10^{-6}$ A

10^{12} e / second

mesoscopic 10^{-6} m

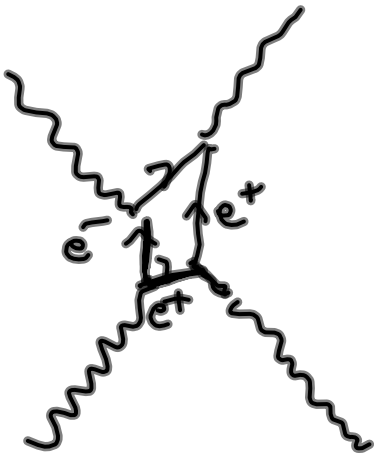




② $F \sim \frac{1}{r^{2+\varepsilon}}$ $\varepsilon < 10^{-16}$

$\phi \sim \frac{e^{-\mu r}}{r}$ $\mu \propto m_\gamma$, $m_\gamma < 4 \times 10^{-51}$ kg

③



⑥

Chapter 1 Electrostatic

1.1 Coulomb's law

$$\vec{F} = k\, q_1 q_2 \frac{(\vec{x}_1 - \vec{x}_2)}{|\vec{x}_1 - \vec{x}_2|^3}$$

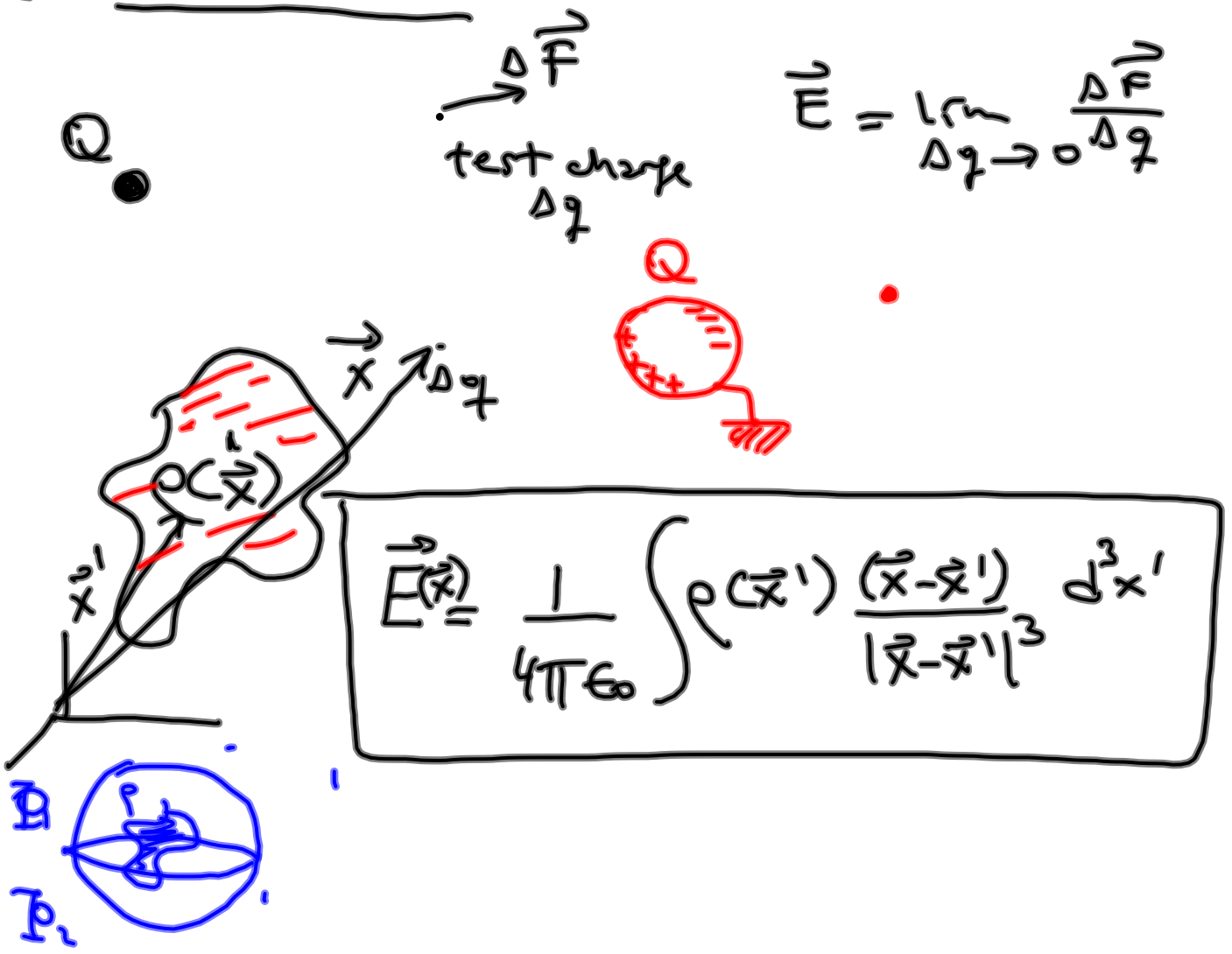
SI

k: $\frac{1}{4\pi\epsilon_0}$, ϵ_0: permittivity of free space

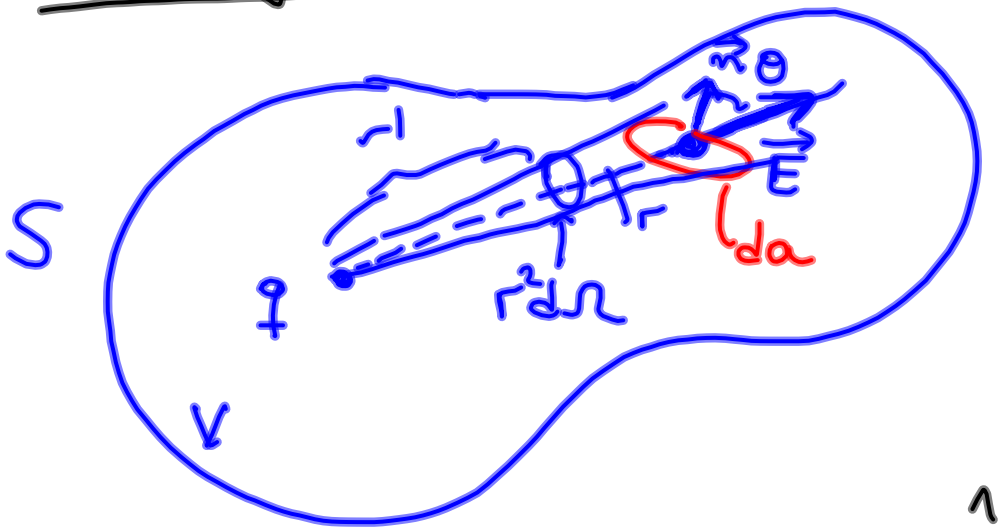
$$\frac{\hat{e}_{12}}{r_{12}^2}$$

$\vec{x} = (x, y, z)$

1.2 Electric Field



1.3 Gauss's law



$$(\vec{E}.\vec{n})da = \frac{1}{4\pi\epsilon_0}\frac{q}{r^{2+\varepsilon}}\overbrace{|\vec{n}|}^{1}\cancel{\cos\theta}\ \underbrace{\frac{\cancel{r^2}d\Omega}{\cancel{\cos\theta}}}_{da}$$

$$= \frac{q}{4\pi\epsilon_0}d\Omega$$

$$\oint_S (\vec{E}\cdot\vec{n})\,da = \frac{q}{4\pi\epsilon_0}\underbrace{\oint_S d\Omega}_{}$$

4π if q inside

0 q outside

$$= \frac{1}{\epsilon_0}\int_V \rho(\vec{x}')\,d^3x'$$