



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Fisica I

Lezione 40 : Carica elettrica

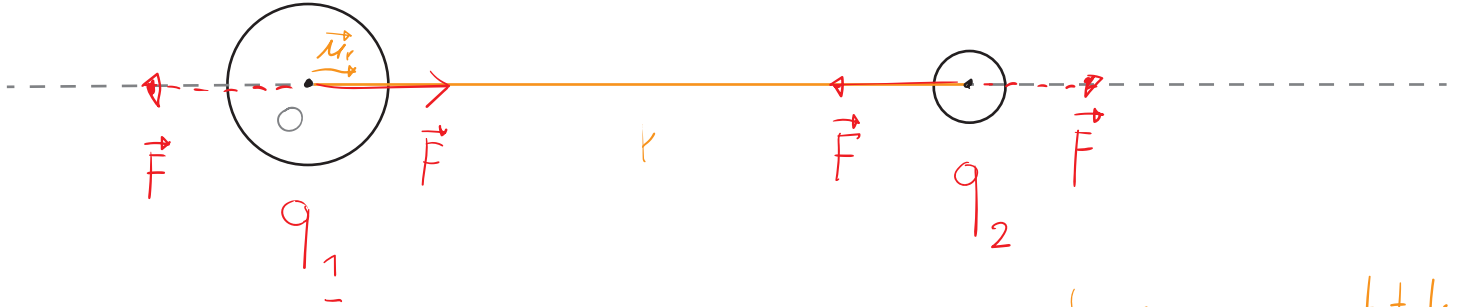
Prof. Giubilato



Coulomb

$$F \propto \frac{q_1 q_2}{r^2}$$

Diagram showing force directions for combinations of charges: (+,+) repulsive, (+,-) attractive, (-,+) attractive, (-,-) repulsive.



Bilancia di torsione \Rightarrow $q \rightarrow K$ relazione quantitativa

$$F \propto \frac{q_1 q_2}{r^2} \Rightarrow \pm K \frac{q_1 q_2}{r^2}$$

carica $[Coulomb][C]$

$K \approx 9 \cdot 10^9 \left[\frac{Nm^2}{C^2} \right]$

$G \approx 6.7 \cdot 10^{-11}$

$$\left. \begin{aligned} |F_g| &= \frac{G \cdot 1 \cdot 1}{1^2} \\ |F_e| &= \frac{K \cdot 1 \cdot 1}{1^2} \end{aligned} \right\} \frac{|F_g|}{|F_e|} < 10^{-20} \quad F_e \approx 9 \cdot 10^9 [N]$$

In genere i corpi hanno $q_T = \phi$

$q_{TOTALE} = \phi$

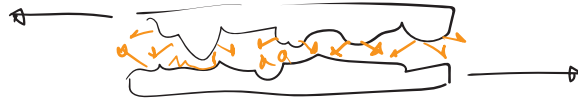
$q_n = \phi$

$F_e \ll F_g$



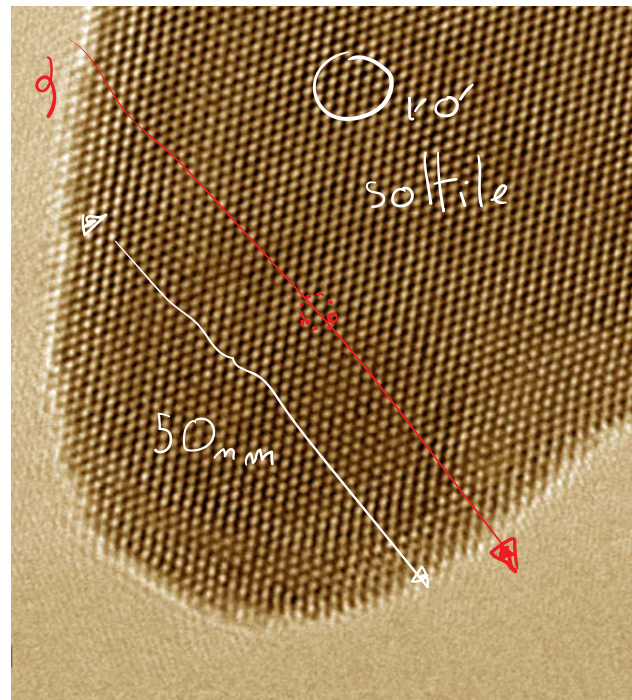
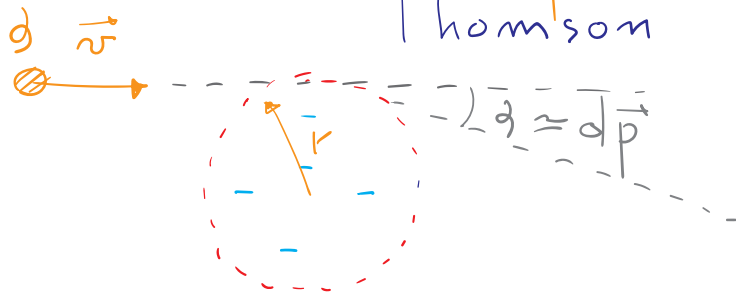
Atvito $[M_s, M_0]$

Elettrostatica ?



Rutherford

Thomson \rightarrow Modello a panettone

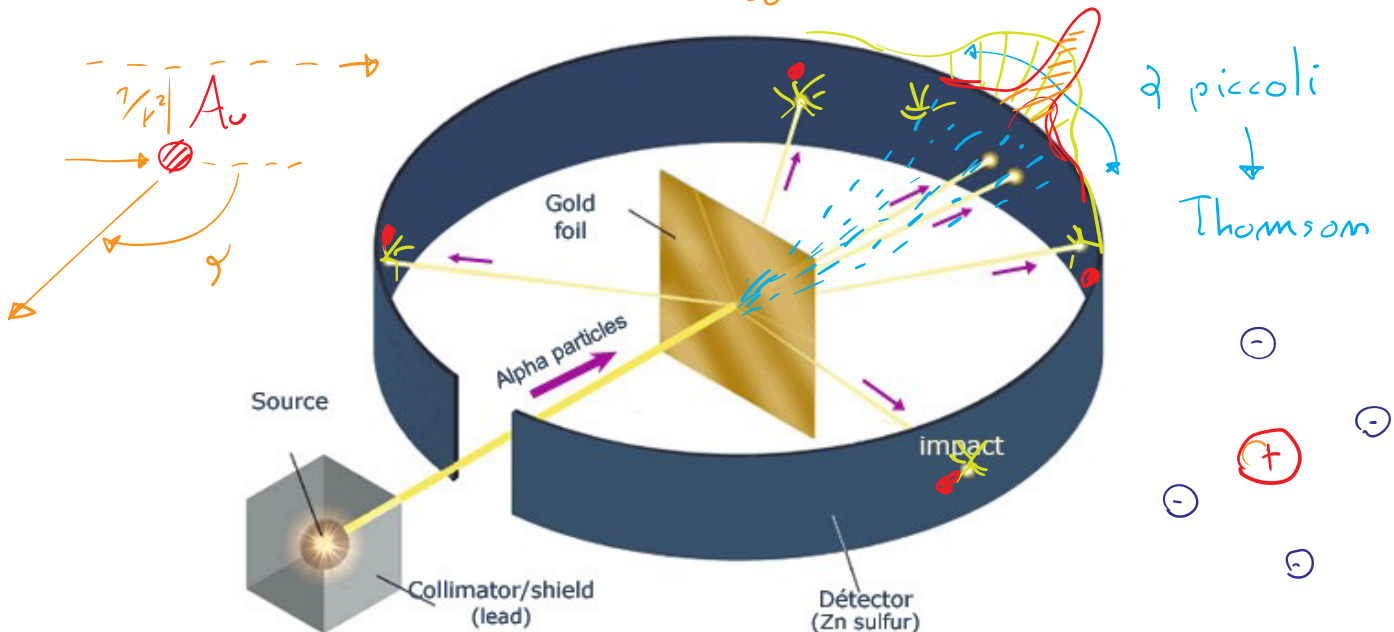


$$\vec{p} = m_a \vec{v}_a \quad \vec{F}_e = K \frac{q_a q_{Au}}{r^2}$$

$$d\vec{p} = \vec{F} dt \quad dt \approx \frac{2r}{v_a}$$

$$\approx \frac{K q_a q_{Au}}{r^2} \frac{2r}{v_a} \propto \frac{1}{r}$$

\rightarrow raggio nucleo A_u





Carica elementare

Compitino 16/6
1mo appello 27/6
2olo appello 13/7

{	[m]	distanza	}	$\in \mathbb{R}$	
	[kg]	massa			
	[s]	tempo			
[C]	carica	$\in \mathbb{R}$	\rightarrow discreta	\rightarrow esiste carica minima q_0	



$$q_0 \approx 1.6 \cdot 10^{-19} \text{ [C]}$$

\rightarrow	protoni \oplus	$q_p = +q_0$	$m_p \approx 1.7 \cdot 10^{-27} \text{ [kg]}$
	elettroni \ominus	$q_e = -q_0$	$m_e = 9 \cdot 10^{-31} \text{ [kg]}$
	neutroni \circ	$q_n = 0$	$m_n \approx m_p$

F_e, F_g tra protone, elettrone



$$F_e \propto K \cdot q_e \cdot q_p \approx 9 \cdot 10^9 \cdot 1.6 \cdot 10^{-19} \cdot 1.6 \cdot 10^{-19} \approx 3 \cdot 10^{-29}$$

$$F_g \propto G \cdot m_e \cdot m_p \approx 6.7 \cdot 10^{-11} \cdot 9 \cdot 10^{-31} \cdot 1.7 \cdot 10^{-27} \approx 1.4 \cdot 10^{-67}$$

$$\approx 10^{40}$$



Millikan

