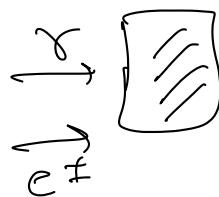


Token: 708 350

Sciare EM



$E_\gamma > \varepsilon_{\text{thr}}$ $N + \gamma \rightarrow e^+ e^- + N$

$$\frac{1}{X_{e^+ e^-}} = \frac{7}{9} \frac{1}{X_0}$$

$e^+ e^- + N \rightarrow e^+ e^- + \gamma + N$

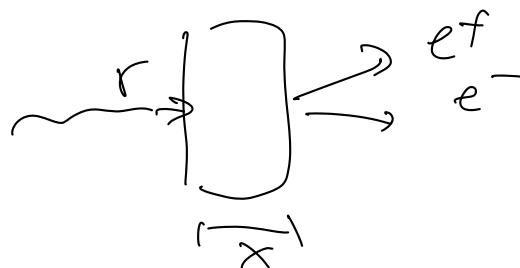
hypothese di radiazione.

$$E_e(x) = E_0 e^{-x/X_0}$$

$$I_\gamma(x) = I_0 e^{-x/X_{e^+ e^-}}$$

$$\varepsilon_{\text{thr}} = 1.01 \text{ MeV}$$

$$\text{Bremsc. } E > E_C \approx \frac{600 \text{ MeV}}{Z_{\text{met}}}$$

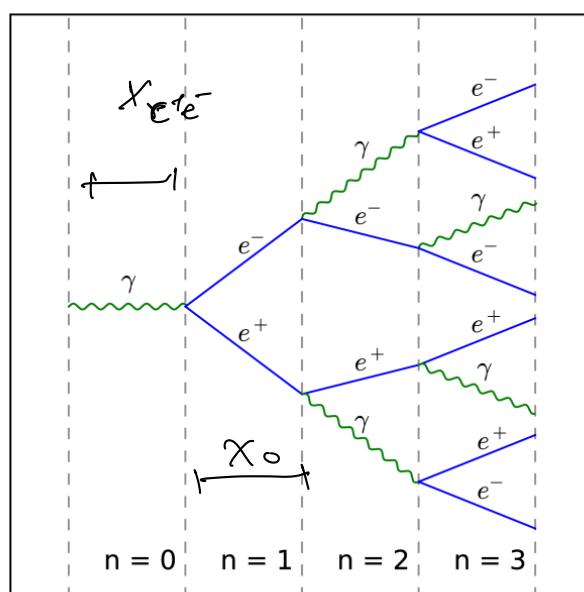


$$E_0 \approx 10 \text{ GeV} \gg E_C, \varepsilon_{\text{thr}}$$

$$\gamma \rightarrow e^+ e^-$$

$$e^+ \rightarrow e^+ \gamma$$

$$e^- \rightarrow e^- \gamma$$



Sciare EM

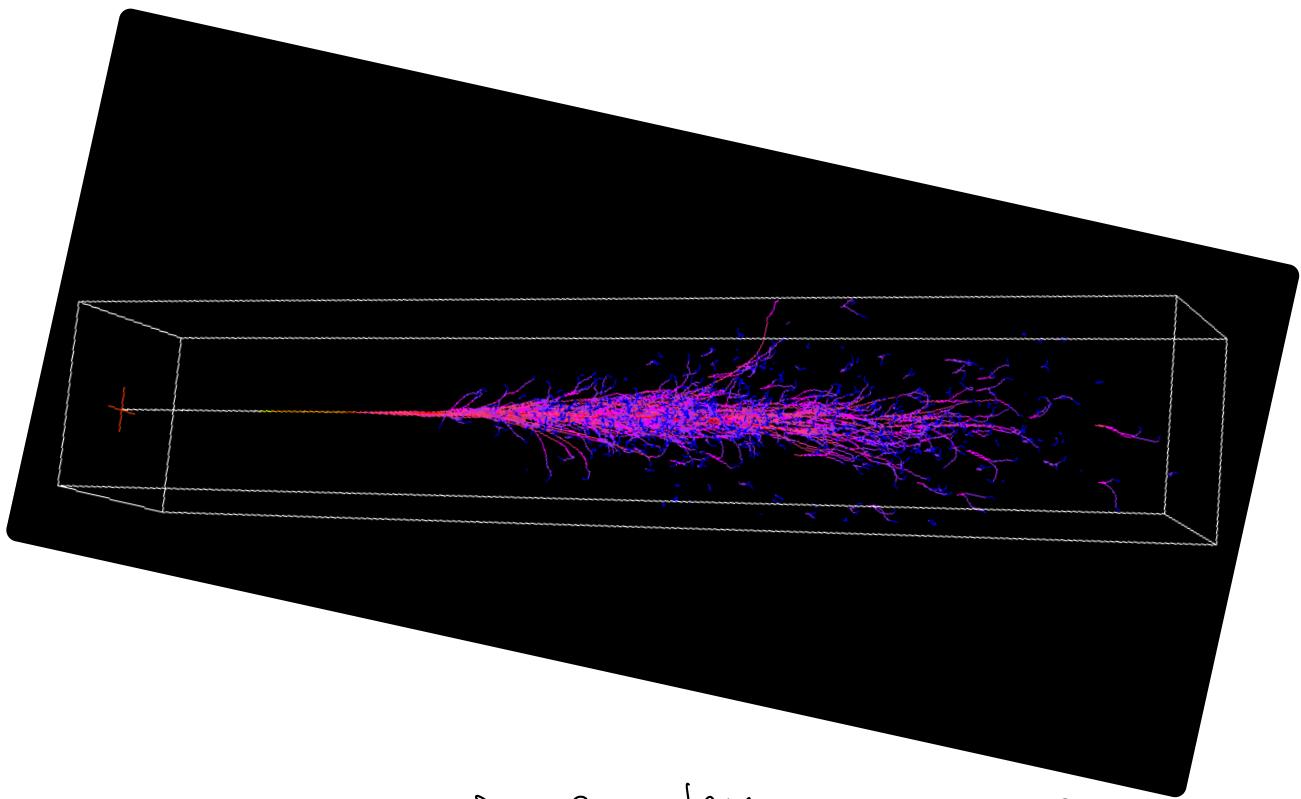
$$\frac{1}{\lambda_{e^+e^-}} = \frac{f}{q} \frac{1}{x_0} \rightarrow x_0 \text{ scale di lunghezze di rif}$$

$$E_0 \xrightarrow{x_0} \frac{E_0}{2} e^- \xrightarrow{x_0} \left(\frac{E_0}{2}\right)^{\frac{1}{2}} \gamma$$

$$\frac{E_0}{2} e^+ \quad \left(\frac{E_0}{2}\right)^{\frac{1}{2}} e^-$$

quando $E_\gamma < E_{mc}$ \Rightarrow non converte più

$E_{e^\pm} < E_c \Rightarrow$ non radia più



Per $E_\gamma < E_{mc}$

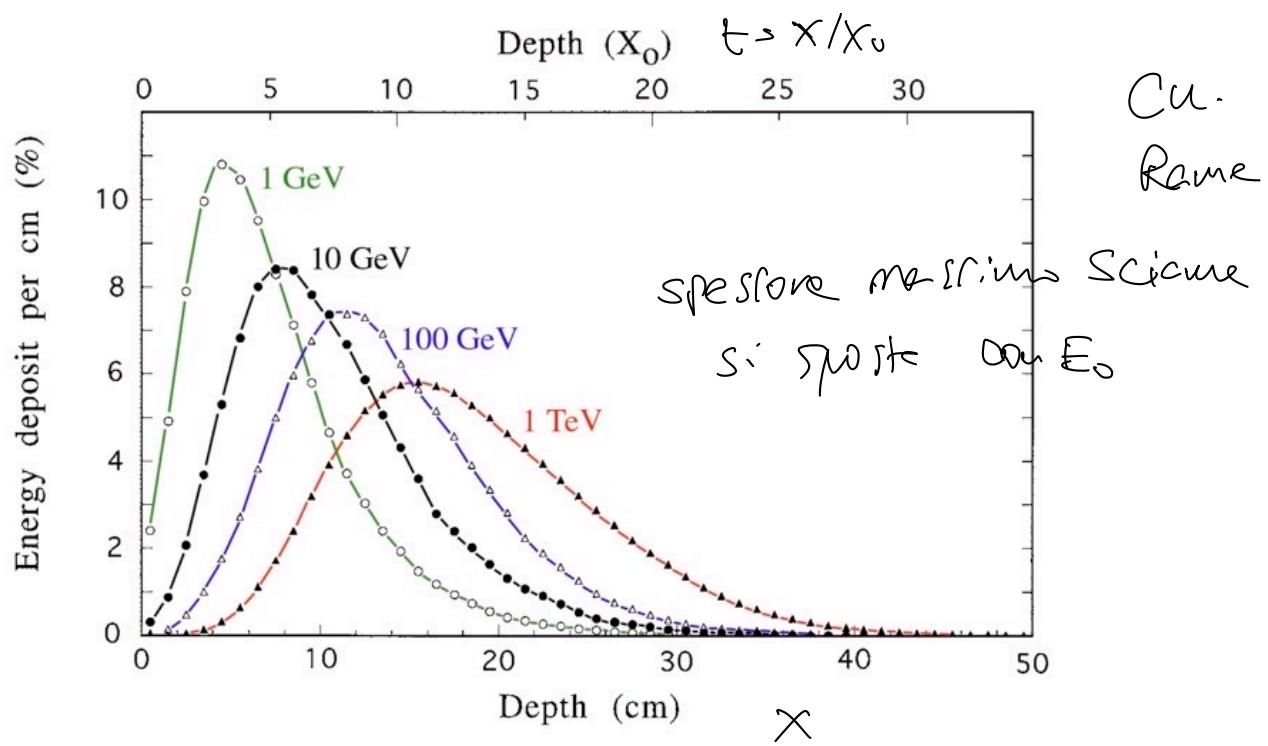
- 1) Compton $\gamma + e^- \rightarrow \gamma + e^-$
- 2) fotoelettrico

$E_{e^-} < E_c$

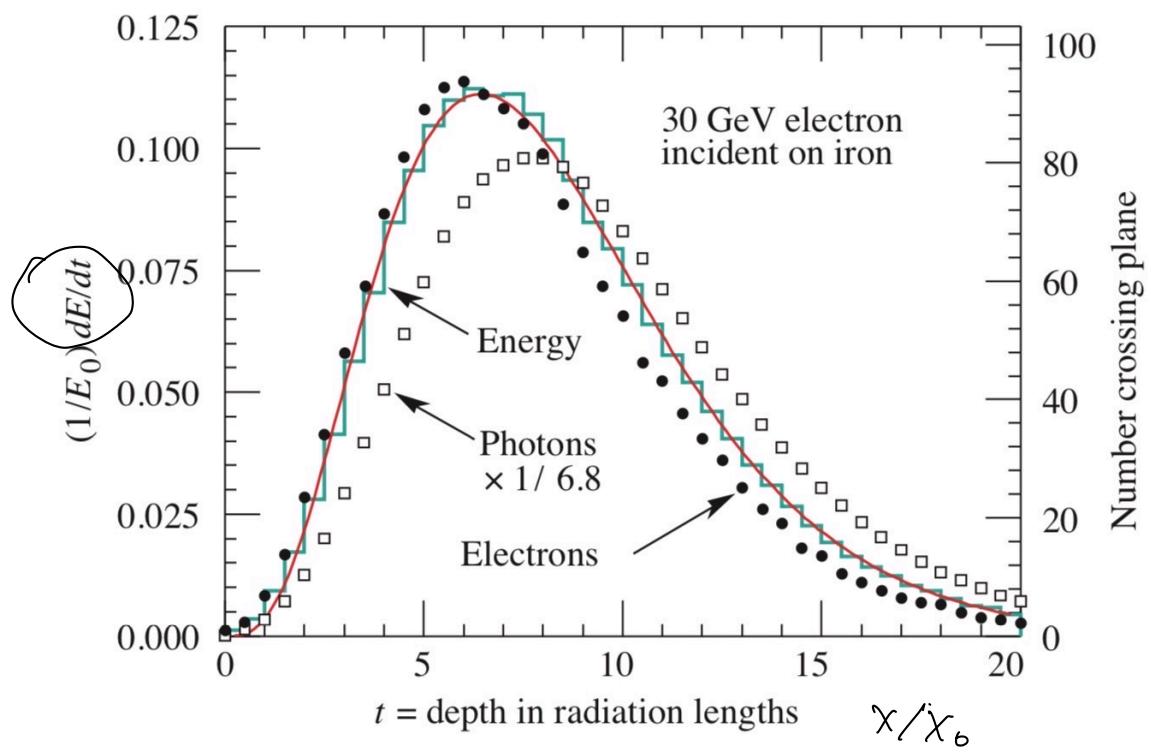
- 1) ionizzazione

$E_{e^+} < E_c$

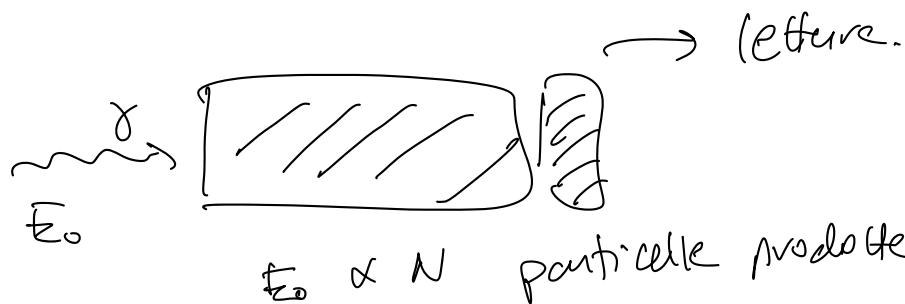
- 1) ionizzazione
- 2) $e^+ + e^- \rightarrow 2\gamma$ $\gamma = m_e = 0.5 \text{ MeV}$



Caratterizza lo sciumo: E_0 energia minima possibile
 X_0 del materiale.



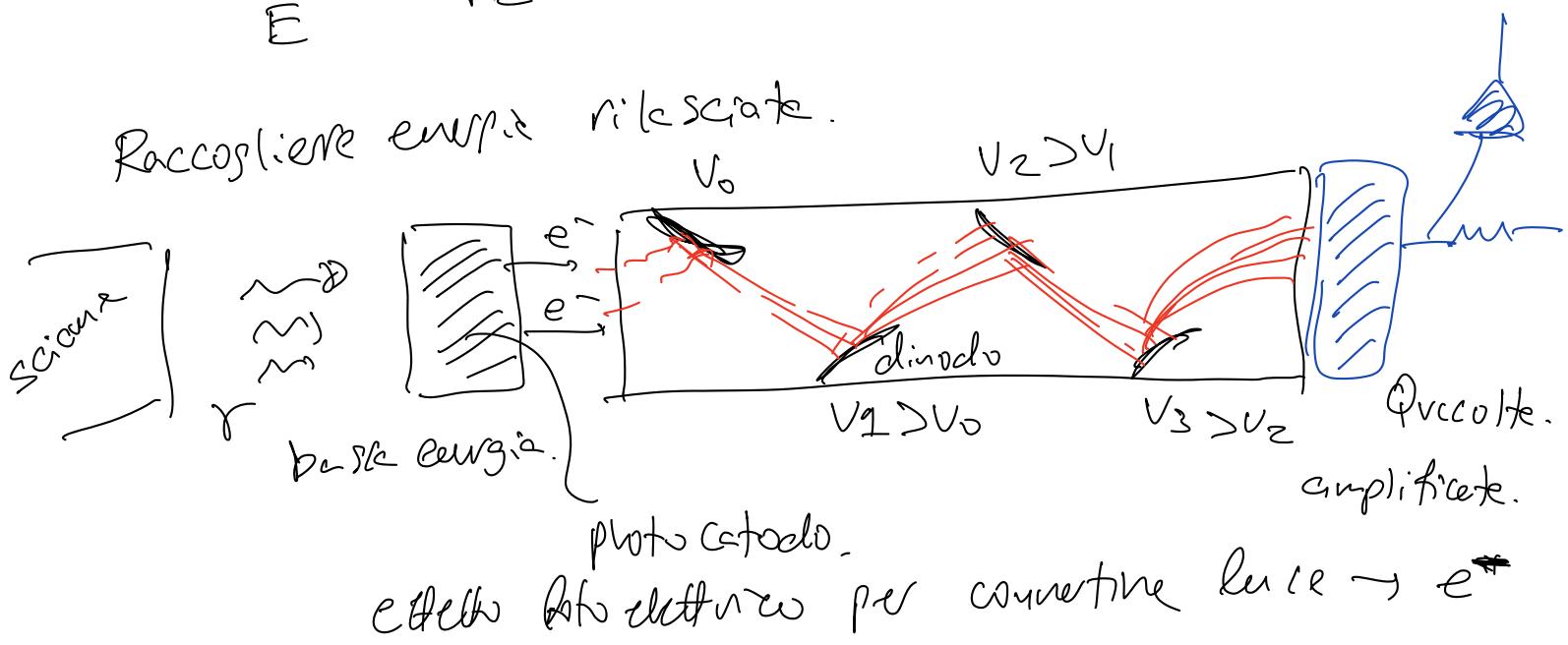
$$F(t) \propto t^{\alpha} e^{-bt}$$



$$\delta E_0 \sim \sqrt{N}$$

$$\frac{\delta E}{E} \propto \frac{1}{\sqrt{E}}$$

Raccoglieva emp. riscate.

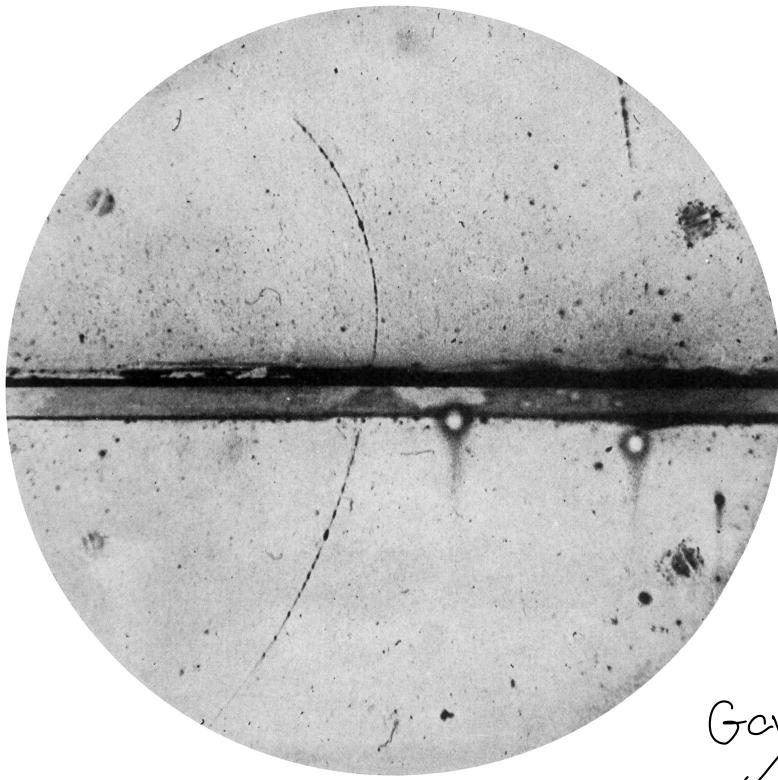


$$Q_{\text{reco}} \text{ [fe]} = \text{Avg. } Q_{\text{in.}} \hookrightarrow 10^4 - 10^7$$

$$Q_{\text{in}} \propto E_0$$

$$\Rightarrow Q_{\text{reco}} \text{ [fe]} \propto E_0$$

Tracceatori



Gargamelle

Risolvibile spaziale.

$$\delta S \approx 500 \mu\text{m}$$

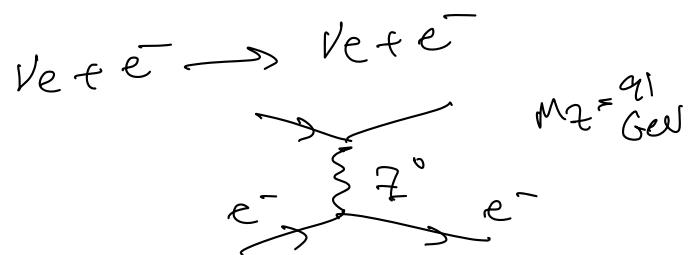
$$\frac{\delta p}{p} \propto P$$

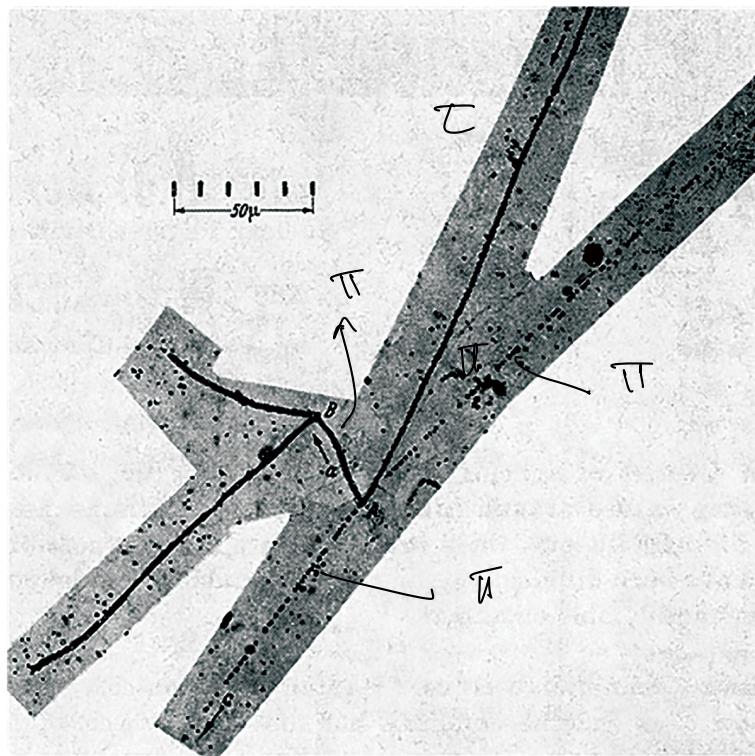
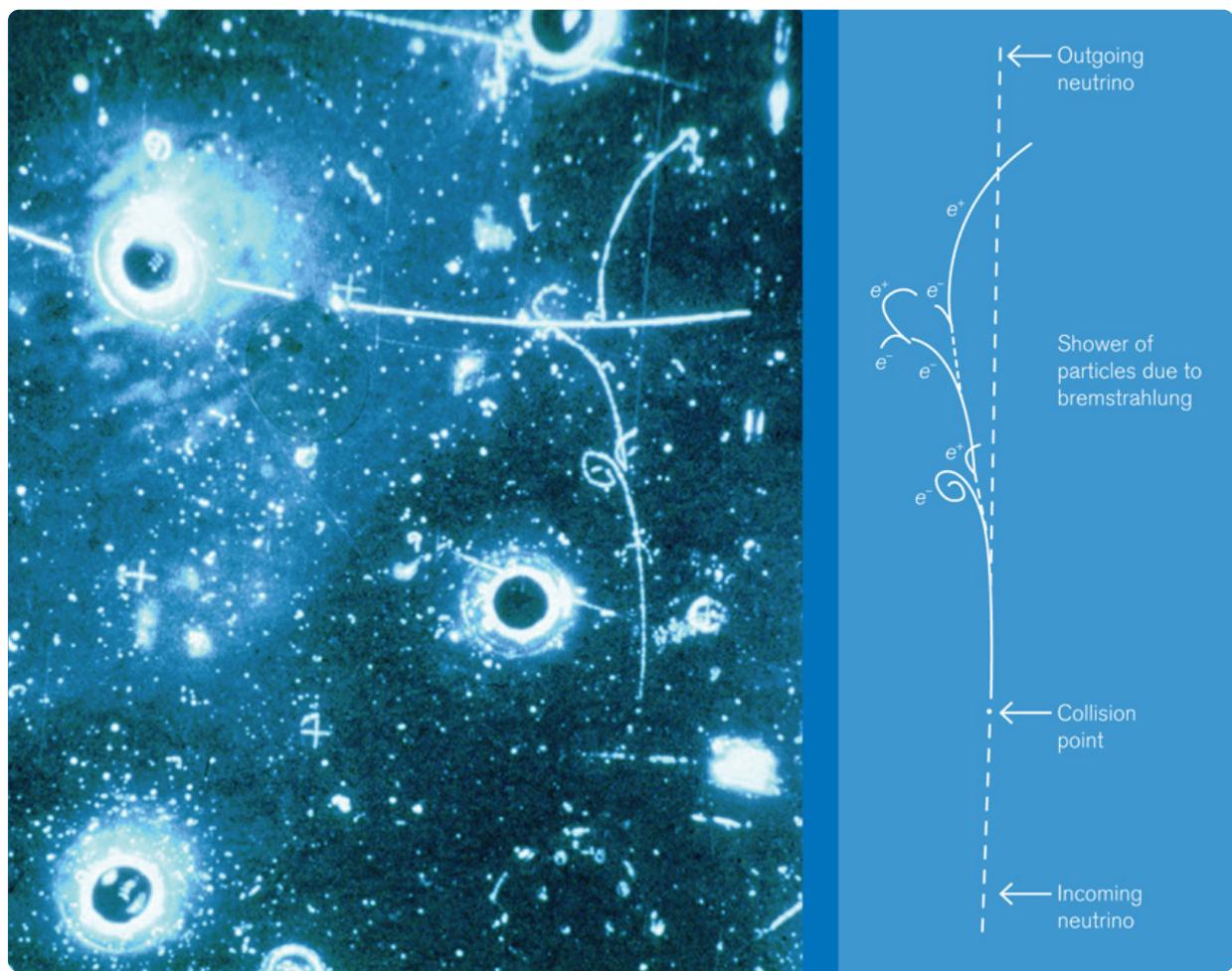
$$P = 0.3 B [T] R [m]$$

Camere = nebbie.



Camere a bolle $\delta \leq 100 \mu\text{m}$

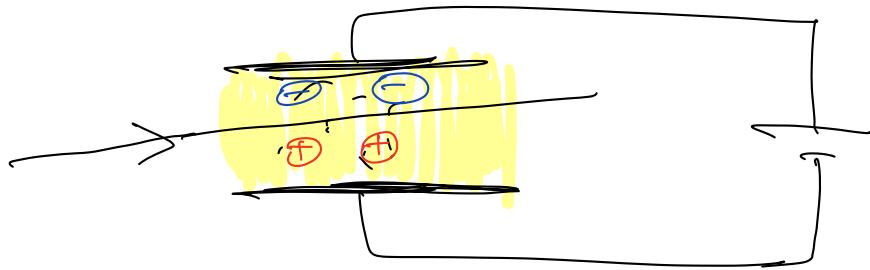




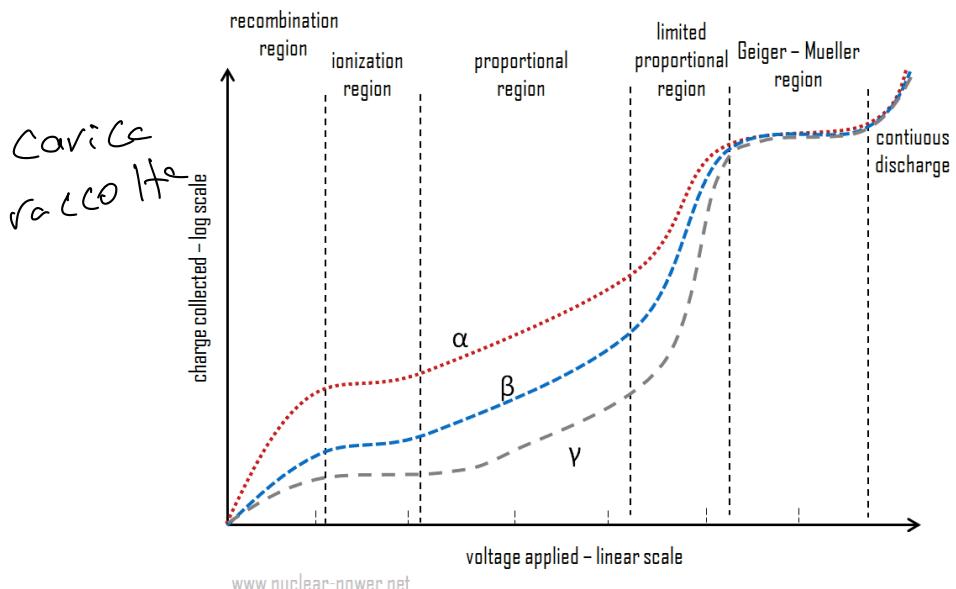
Emulsioni nucleari
Bromuro di argento
sciolto in matrici
gelatinoso
 $\delta s \approx 1 \mu m$

$$\tau^- \rightarrow \pi^- \pi^+ \bar{\nu}^-$$

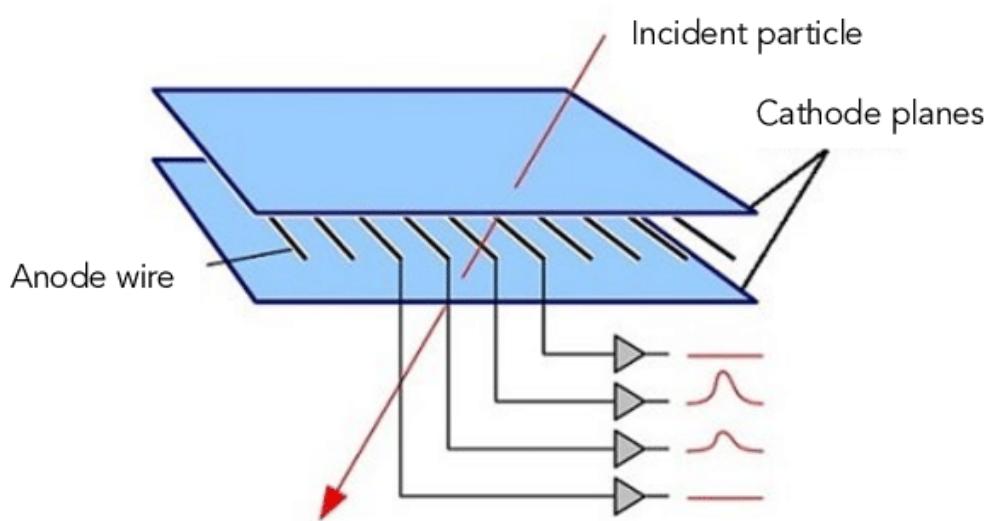
Rivelatori a ioni 27 febbraio

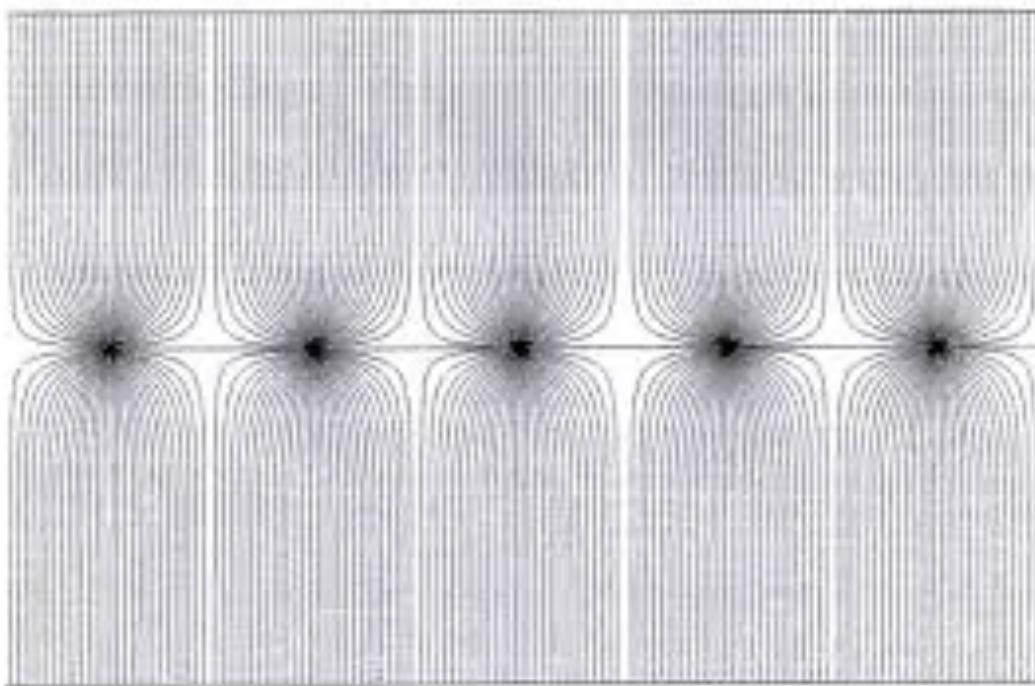


Regions of Gaseous Ionization Detectors



Rivelatori a ionizzazione.

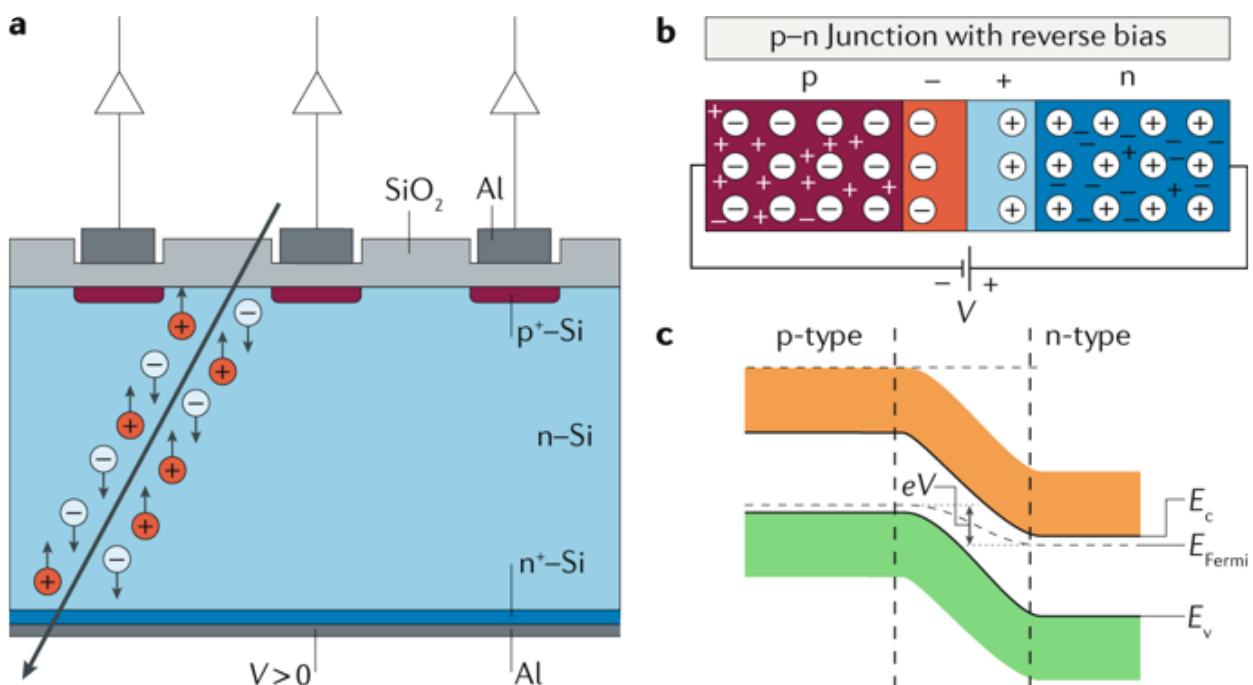




Dist. for
due fil:
1 μm

$$\tau = \frac{L}{\sqrt{2}} \approx 300 \mu\text{m}$$

Rivelatori multifili:

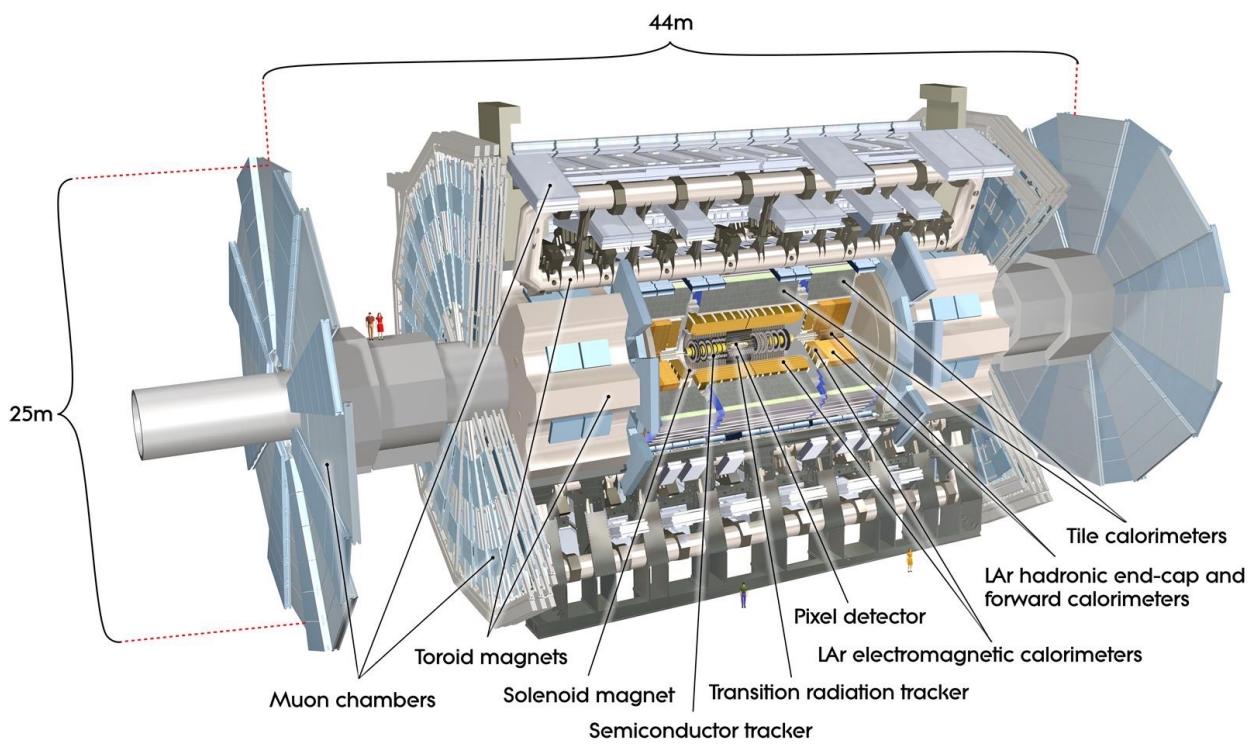
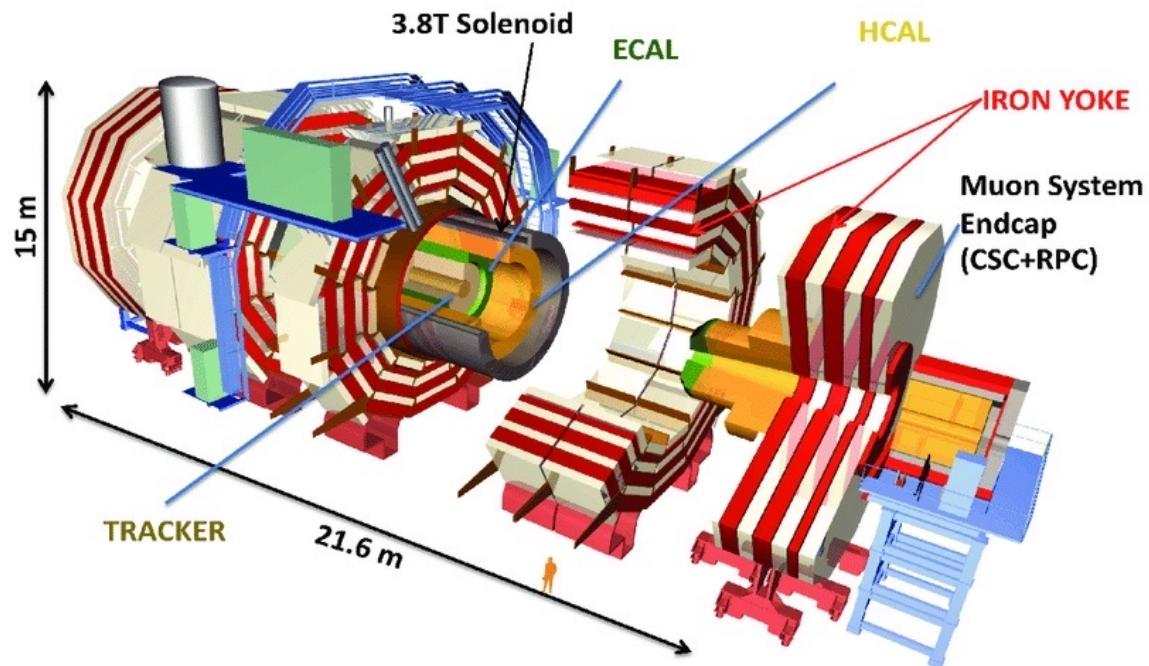


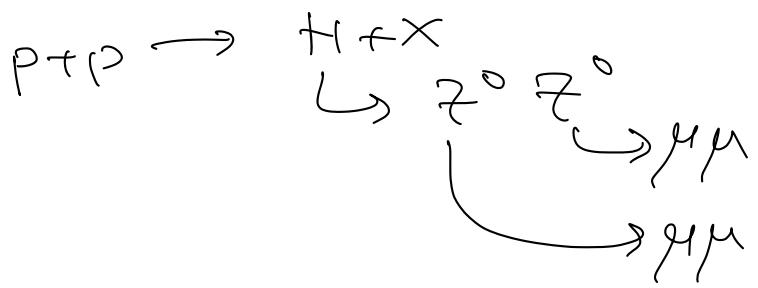
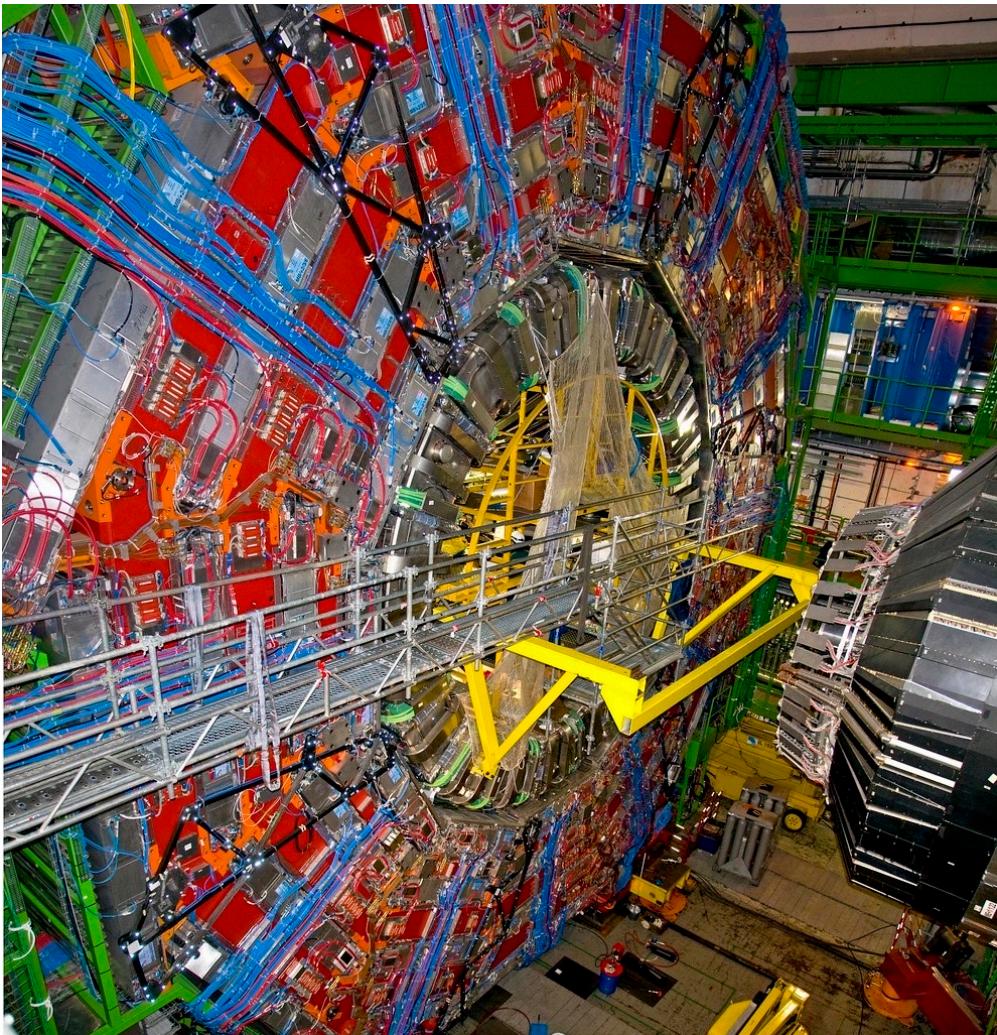
Potenzialzone - $\frac{dE}{dx} \propto \rho \propto f(\beta r)$

$$\Delta E \propto \frac{dE}{dx} \propto \rho \Delta x$$

↳ electric perve per Rivelazione
vgl. o minimi there.

Rivelatori di silicio \Rightarrow ridurre Δx attraverso





Légende:

- Muon
- Électron
- Hadron chargé (ex. Pion)
- - - Hadron neutre (ex. Neutron)
- Photon

