

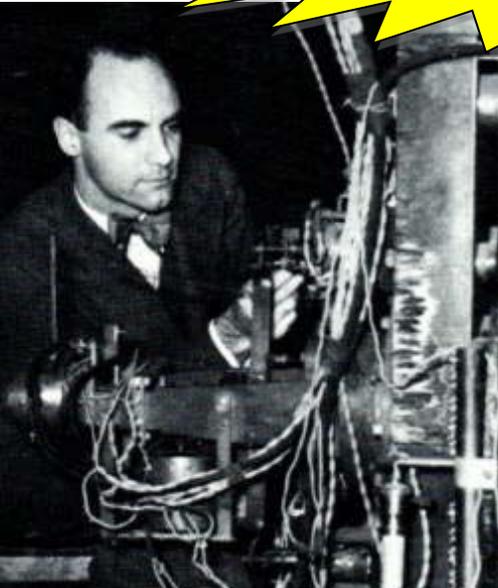
Antimateria

G.F. Giudice



Istituto Veneto
di Scienze Lettere
ed Arti

9 marzo 2011

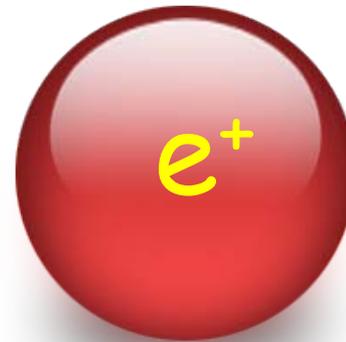


CHIARAMENTE SCIENZA



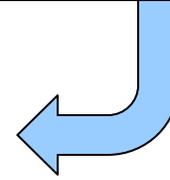
elettrone

orestone

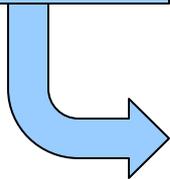




La bomba a orestoni



L'astronave
a orestoni





CAUTION ANTI MATTER





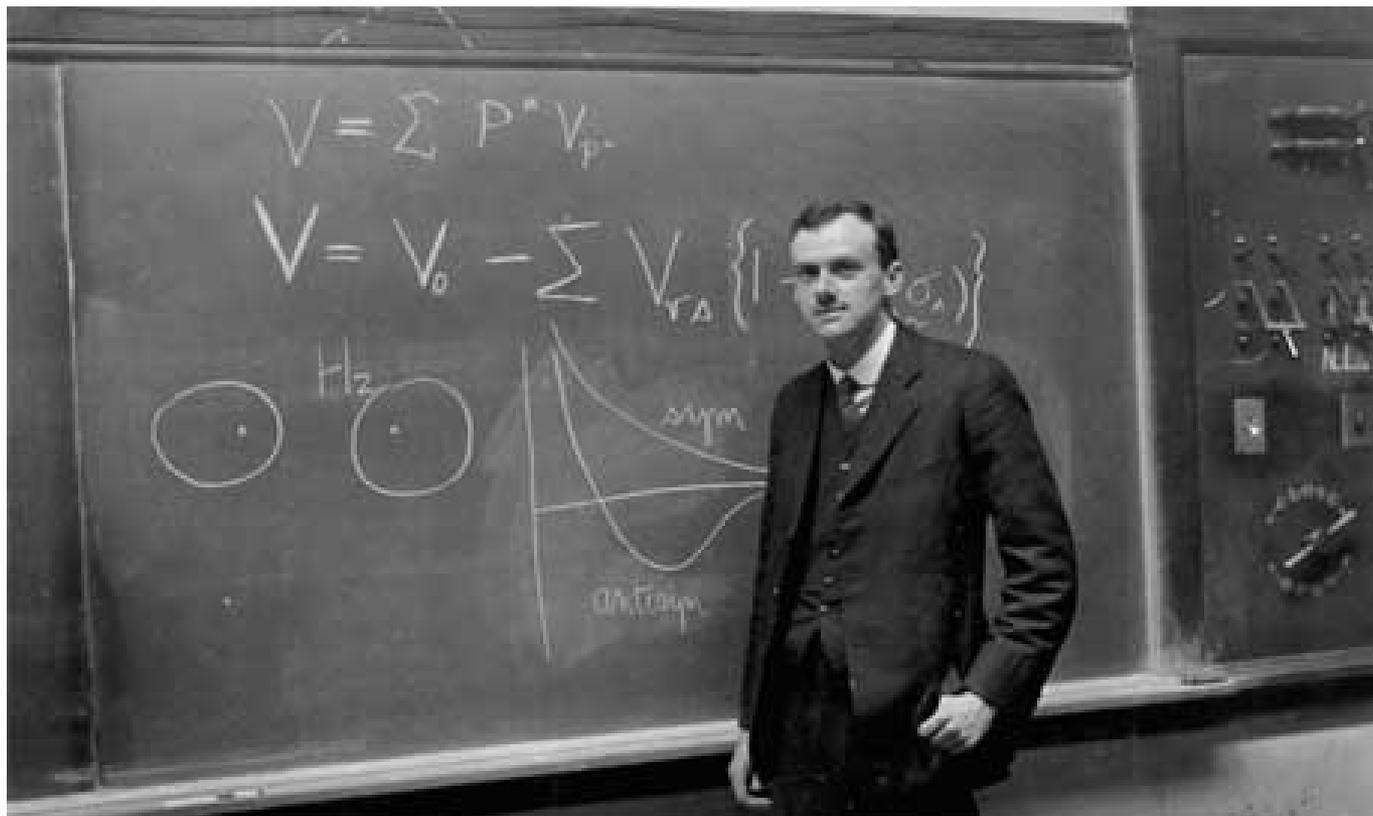
Paul Adrien Maurice Dirac (1902-
1984)



Felix Dirac, 1921

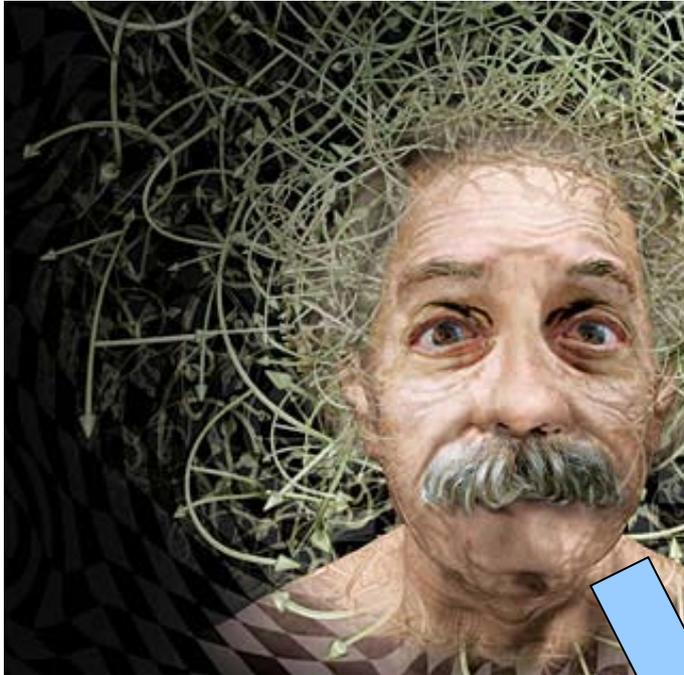


Paul Dirac



relatività ristretta

meccanica
quantistica



equazione di dirac

1902

P·A·M

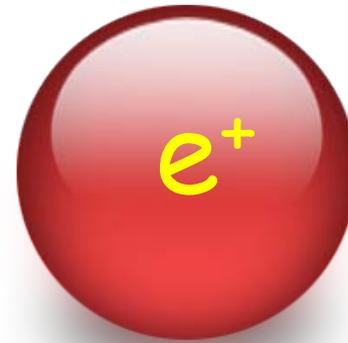
DIRAC O·M

PHYSICIST

$$i\hbar \cdot \partial\psi = m\psi$$

1984

elettrone



energia
negativa?

Quando è stato
eliminato
l'impossibile, ciò che
resta, per quanto
improbabile, deve
essere la verità.



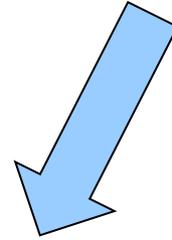
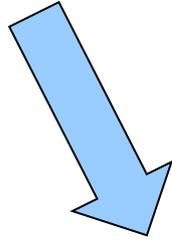
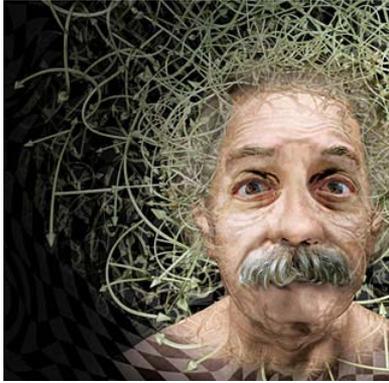
A. Conan Doyle,
Il segno dei
quattro, 1890.

... se esistesse, sarebbe un
nuovo tipo di particella,
sconosciuto alla fisica
sperimentale, dotato della
stessa massa e di carica
opposta a quella dell'elettrone.
Chiameremo questa particella
anti-elettrone.



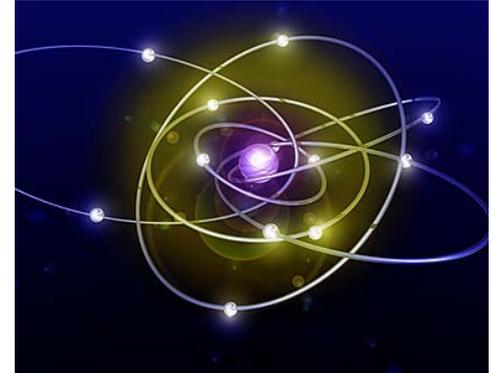
P.A.M. Dirac,
Proc. Roy. Soc.,
1931.

relatività
ristretta

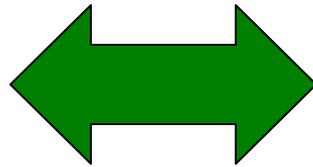


antimateria

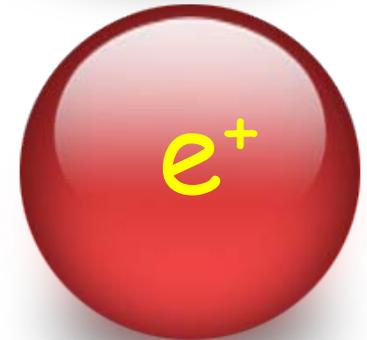
meccanica
quantistica

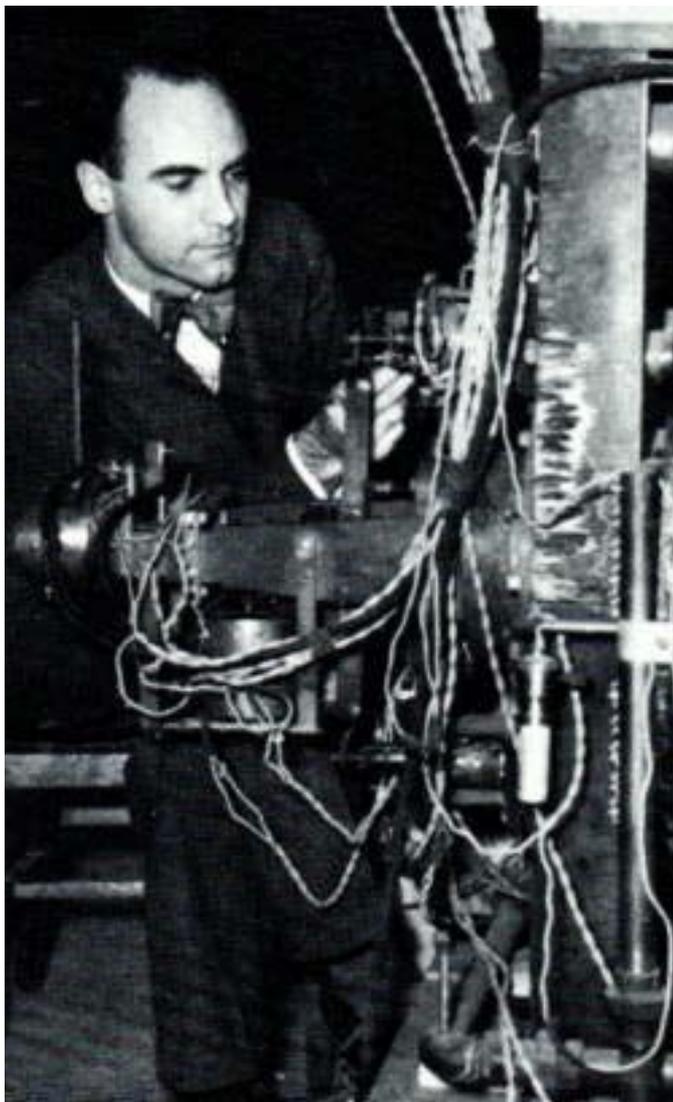


materia

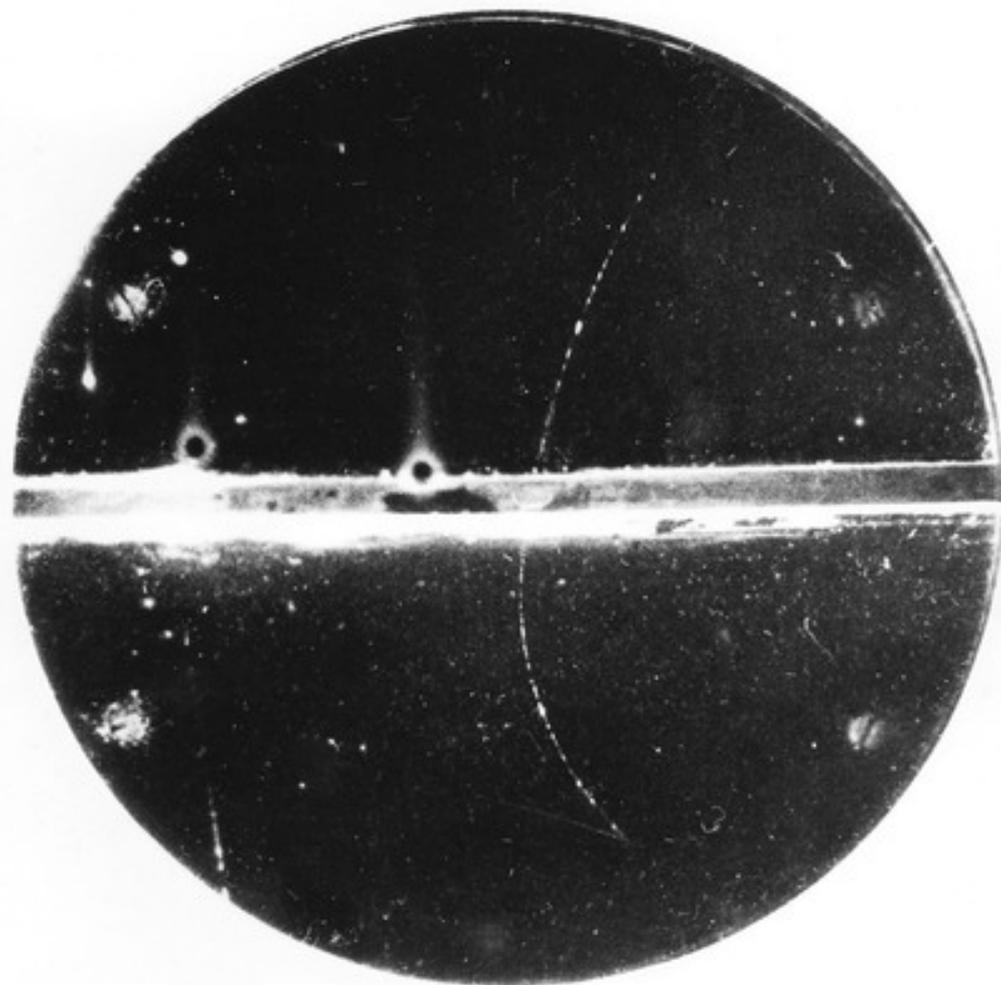


antimateria





Carl Anderson (1905-
1991)



La prima immagine di una
traccia di un positrone (1932)

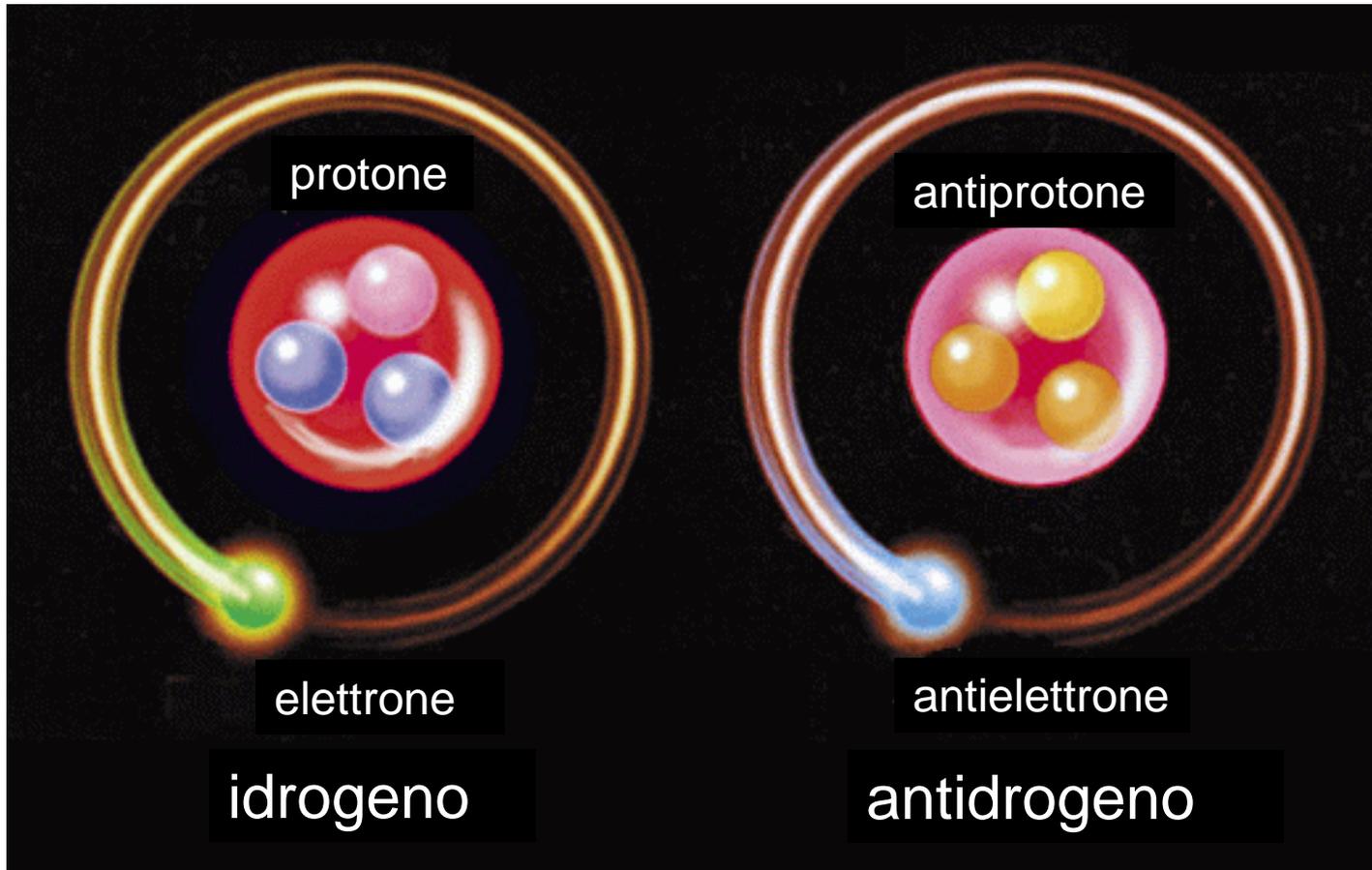
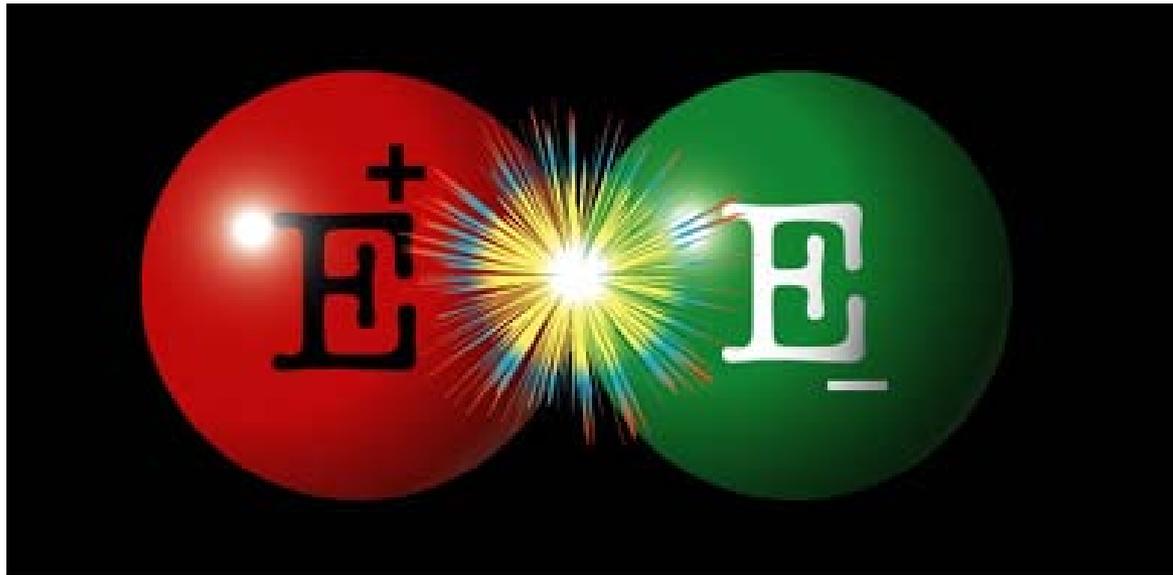
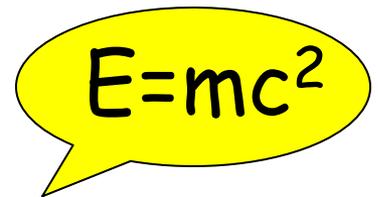
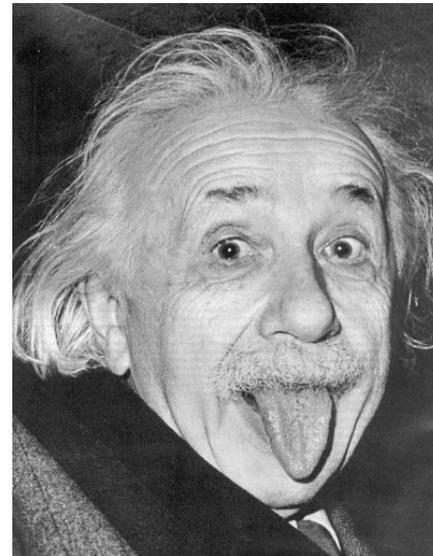
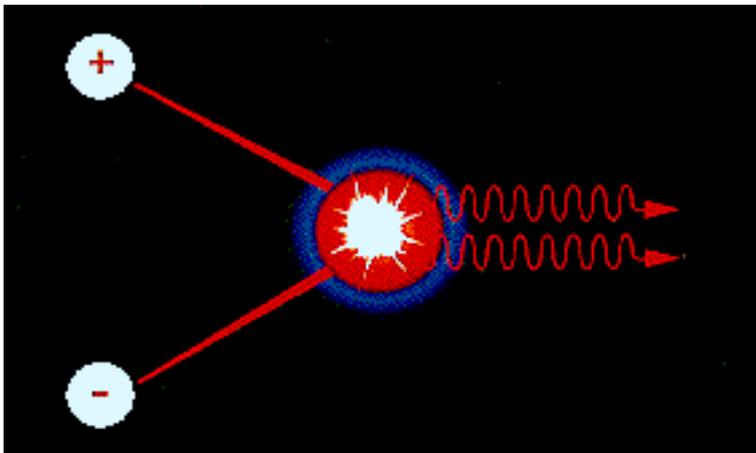


Tavola periodica degli anti-elementi
Anti-chimica



materia + antimateria → **radiazione**





Esplosione chimica

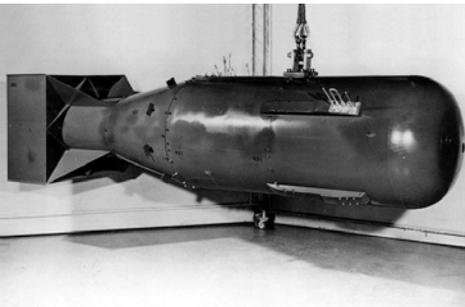
Tritolo

Energia sprigionata: **0,05 miliardesimi** di mc^2



Ferrari 430 Scuderia

300 km/h per 1h consuma 60l = 45 kg di benzina
Il motore produce un'energia pari a 300 kg di TNT
Energia sprigionata: **0,3 miliardesimi** di mc^2



Esplosione nucleare

Little Boy (Hiroshima)

15 kiloton

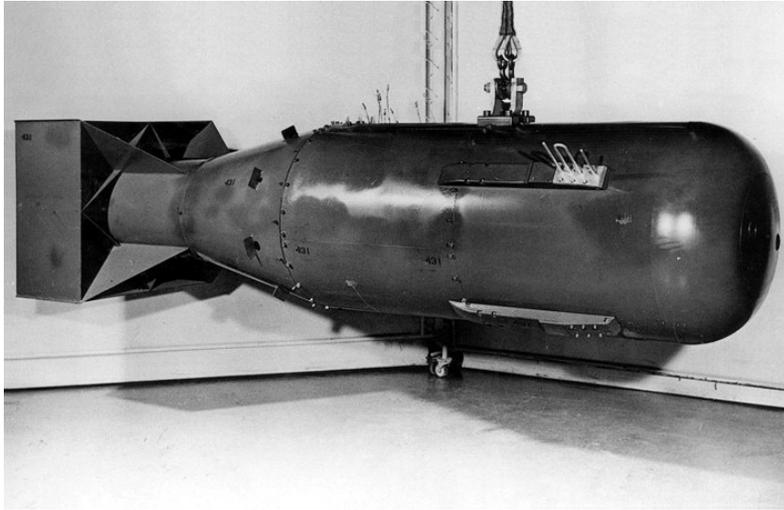
Energia sprigionata: **millesimo** di mc^2



Bomba H

25 megaton

Energia sprigionata: **centinaio** di mc^2



= 0,7 g di antimateria

1 g di antimateria =

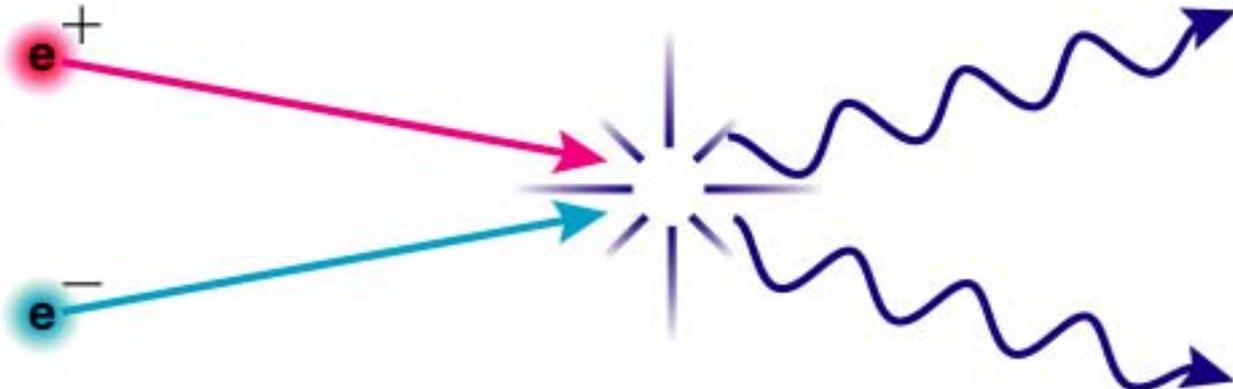


3000 anni!

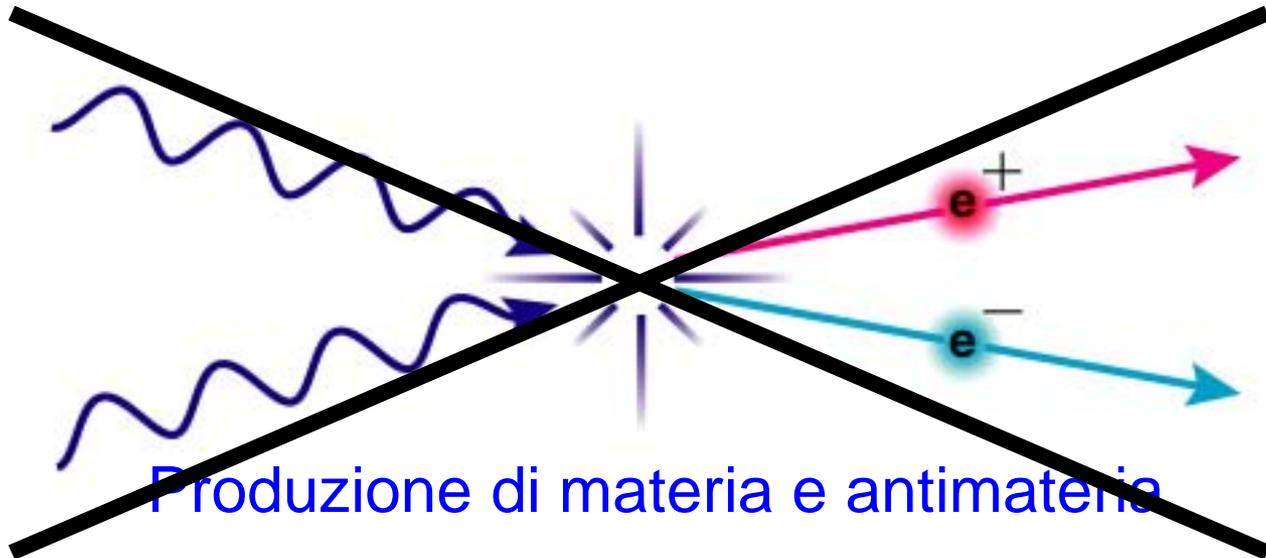


1g di antimateria
1 miliardo di anni
milioni di miliardi di euro

Ipotesi: all'inizio dell'universo
densità di materia = densità di antimateria

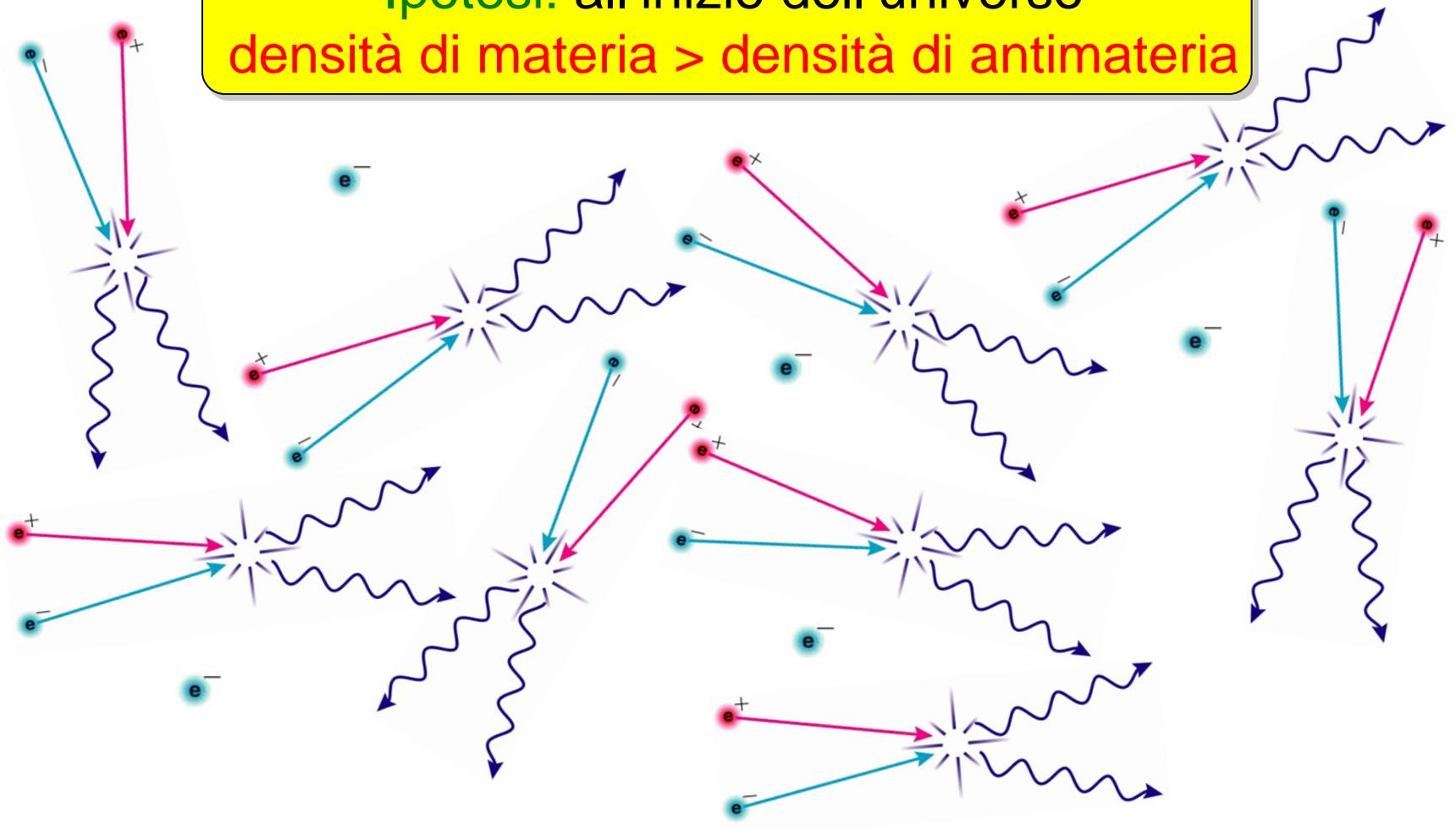


Annichilazione di materia e antimateria

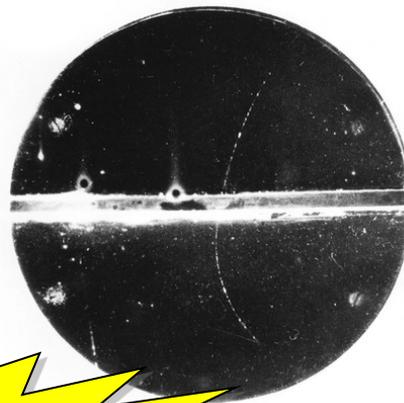
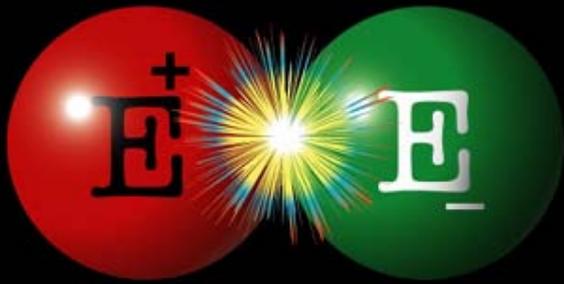


Produzione di materia e antimateria

**Ipotesi: all'inizio dell'universo
densità di materia > densità di antimateria**



**antimateria = 10 miliardi
materia = 10 miliardi + 1**



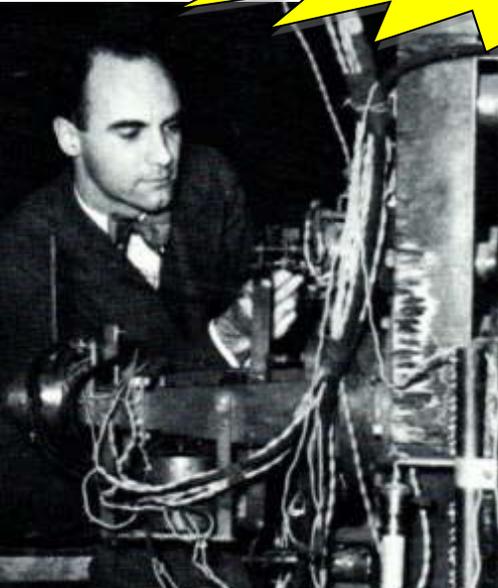
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