

# Antimateria

*HECTOR GARCIA MORALES*

*CERN AND UNIVERSITY OF OXFORD*



@cerntripetas

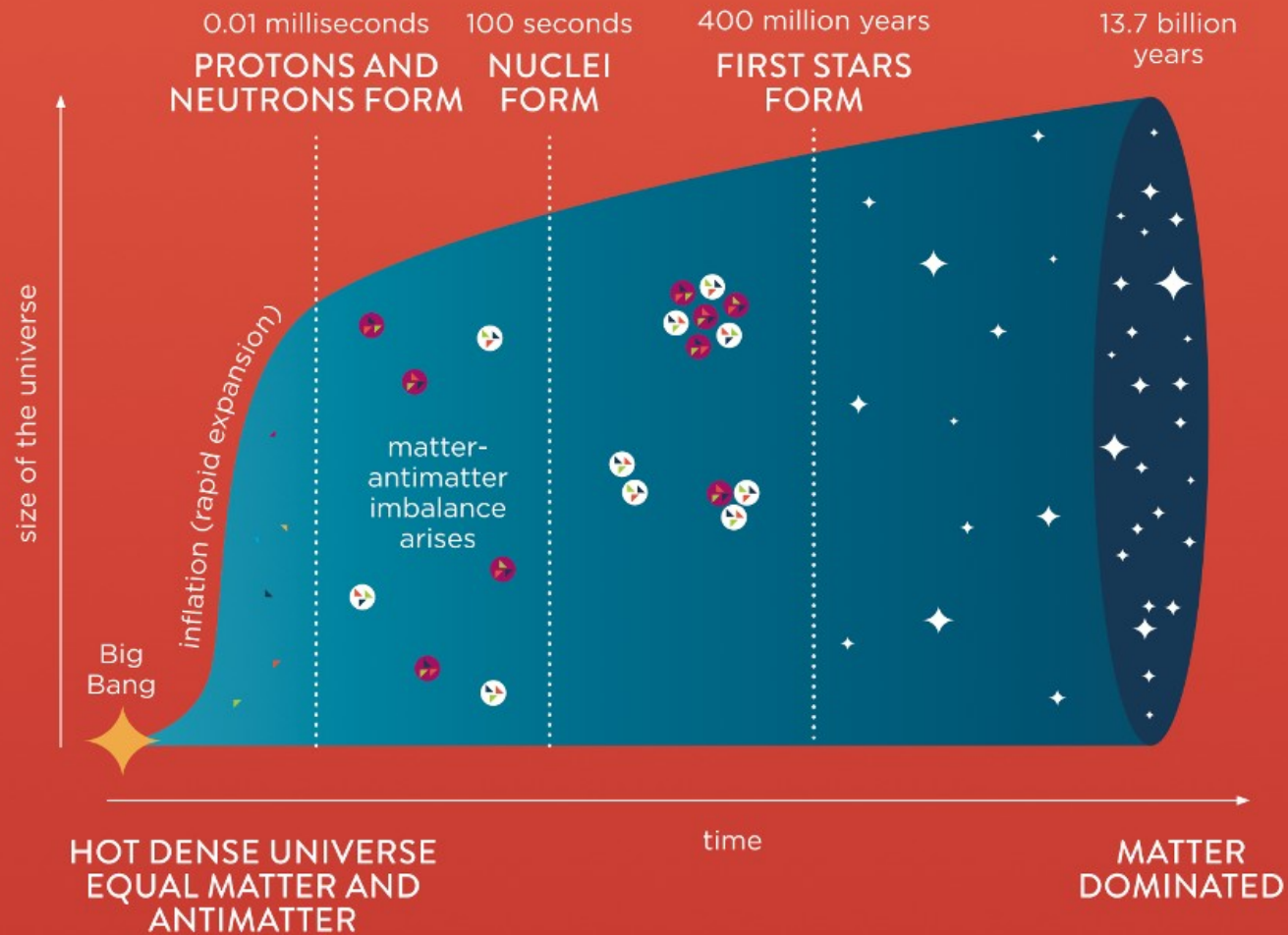


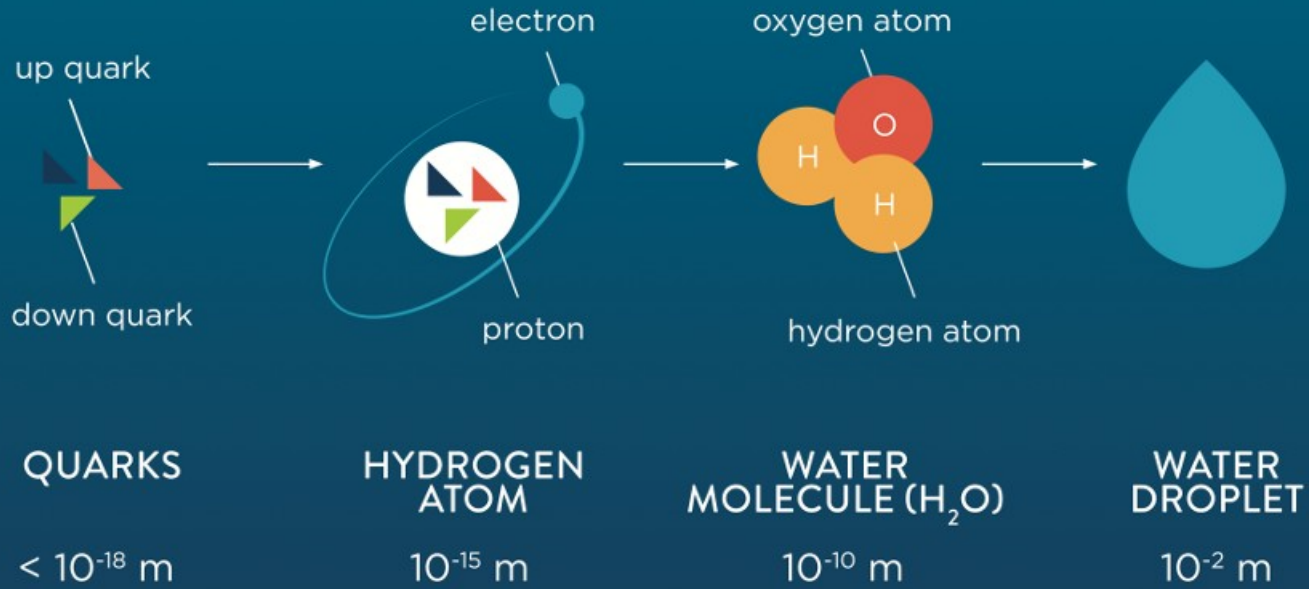


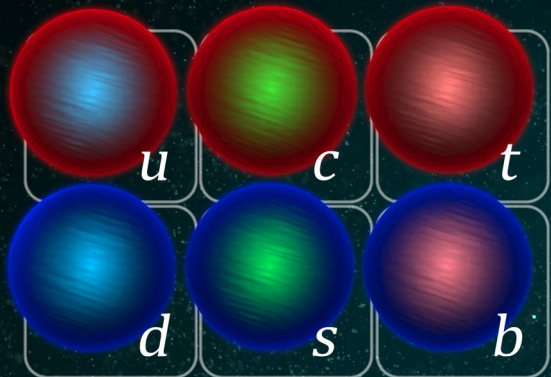
"IN THE BEGINNING  
THE UNIVERSE WAS CREATED.  
THIS HAS MADE A LOT OF PEOPLE ANGRY  
AND BEEN WIDELY REGARDED AS A BAD MOVE."

– DOUGLAS ADAMS

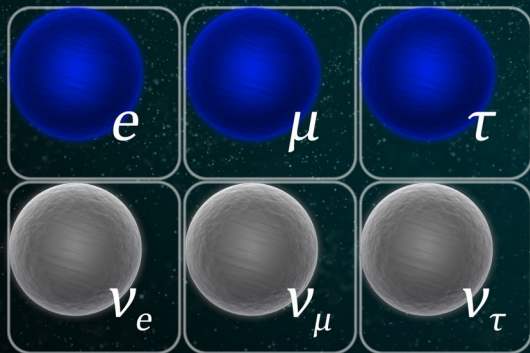




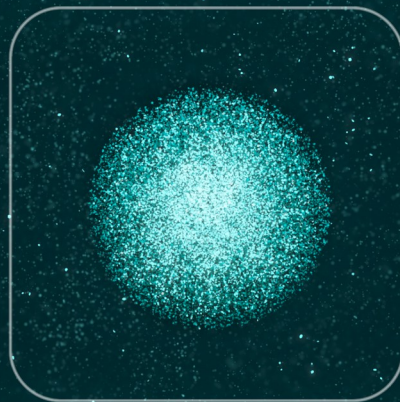




Quarks



Leptons



Higgs boson



Forces



# Antimateria

Quiero estar  
contigo.



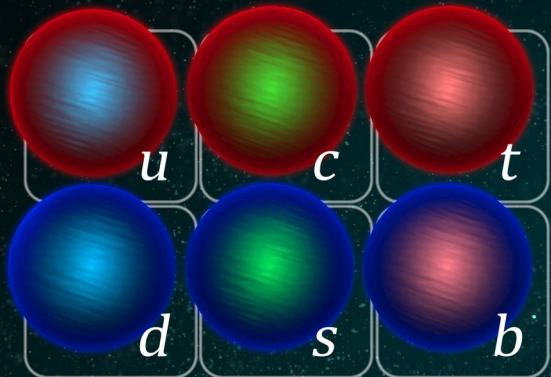
Kavy Pazos

# Materia

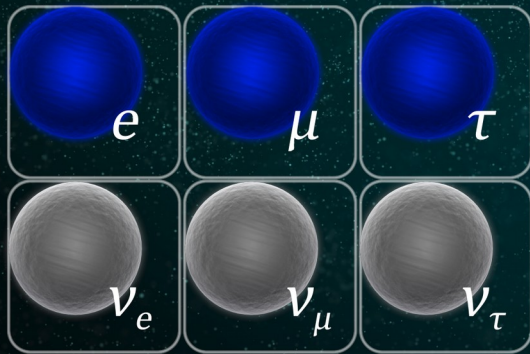
¡No podemos!  
Lo nuestro es una relación  
autodestructiva.



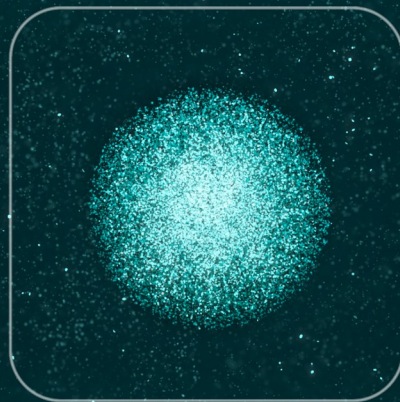
mola  
SABER



Quarks



Leptons



Higgs boson



Forces





# Paul Dirac

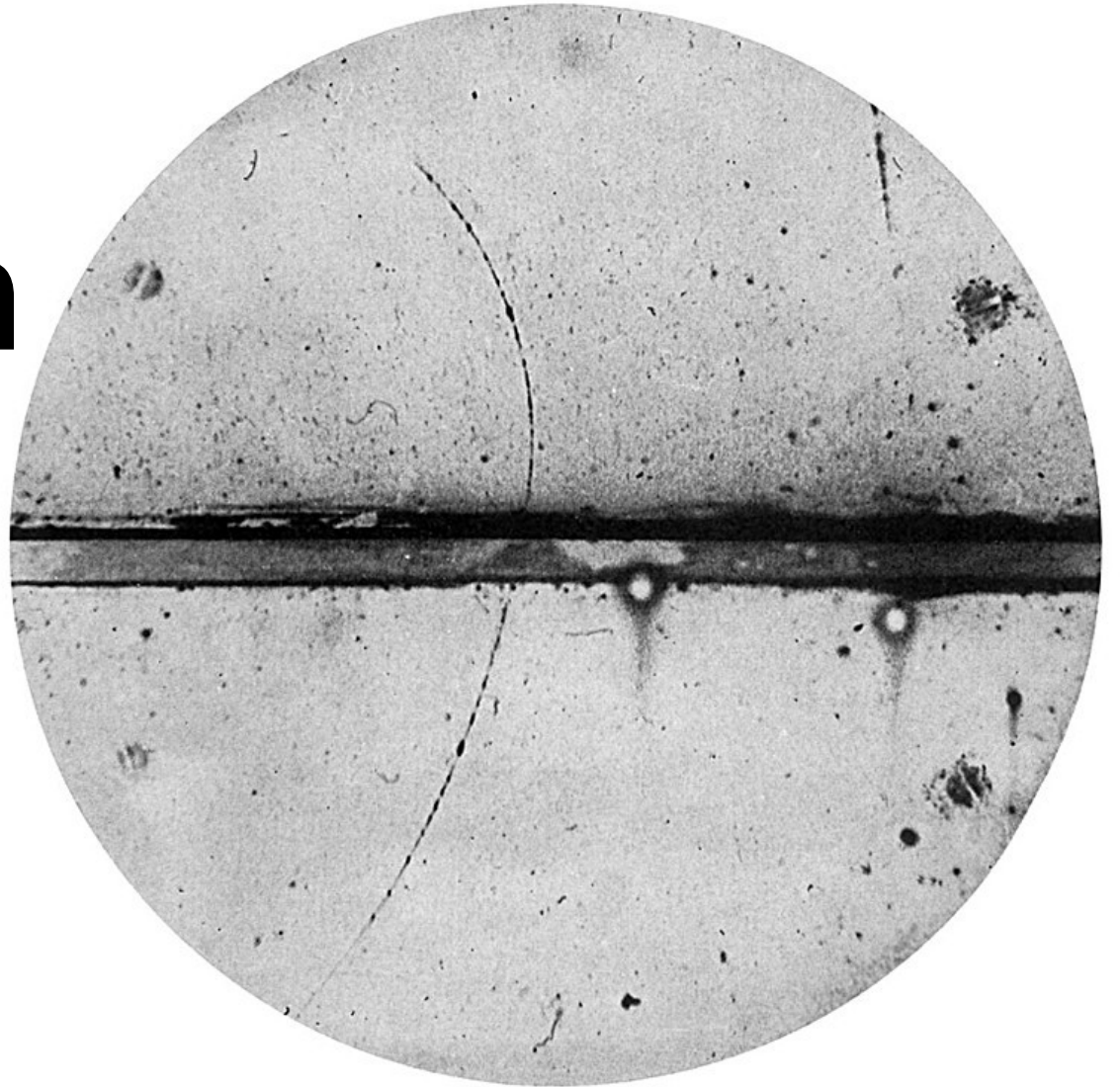


***DIRAC, 1928***

$$(i\gamma \cdot \partial - m)\psi = 0$$



# Karl Anderson



# Karl Anderson

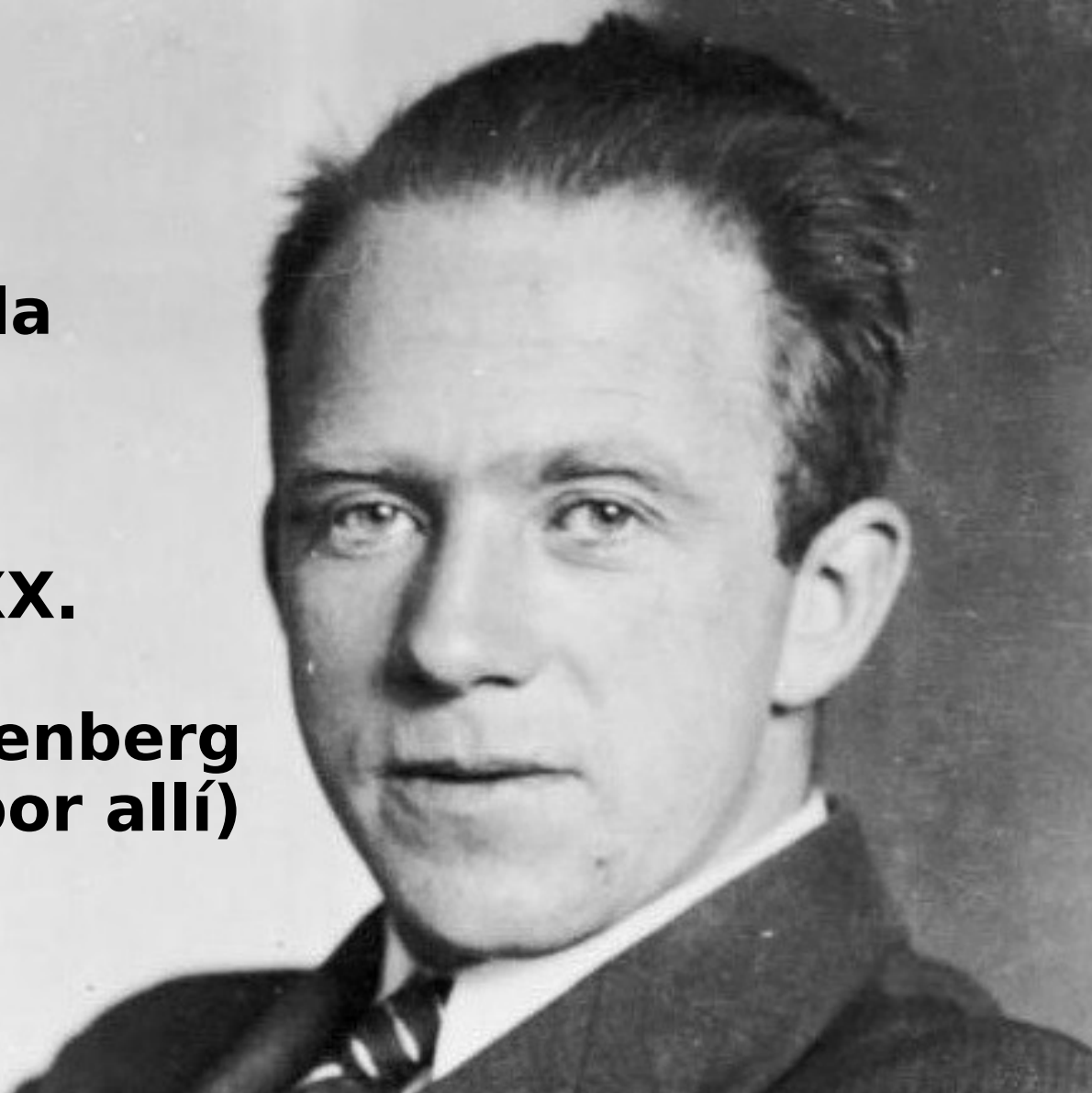


**DO ~~NOT~~ TRY THIS  
AT HOME!**



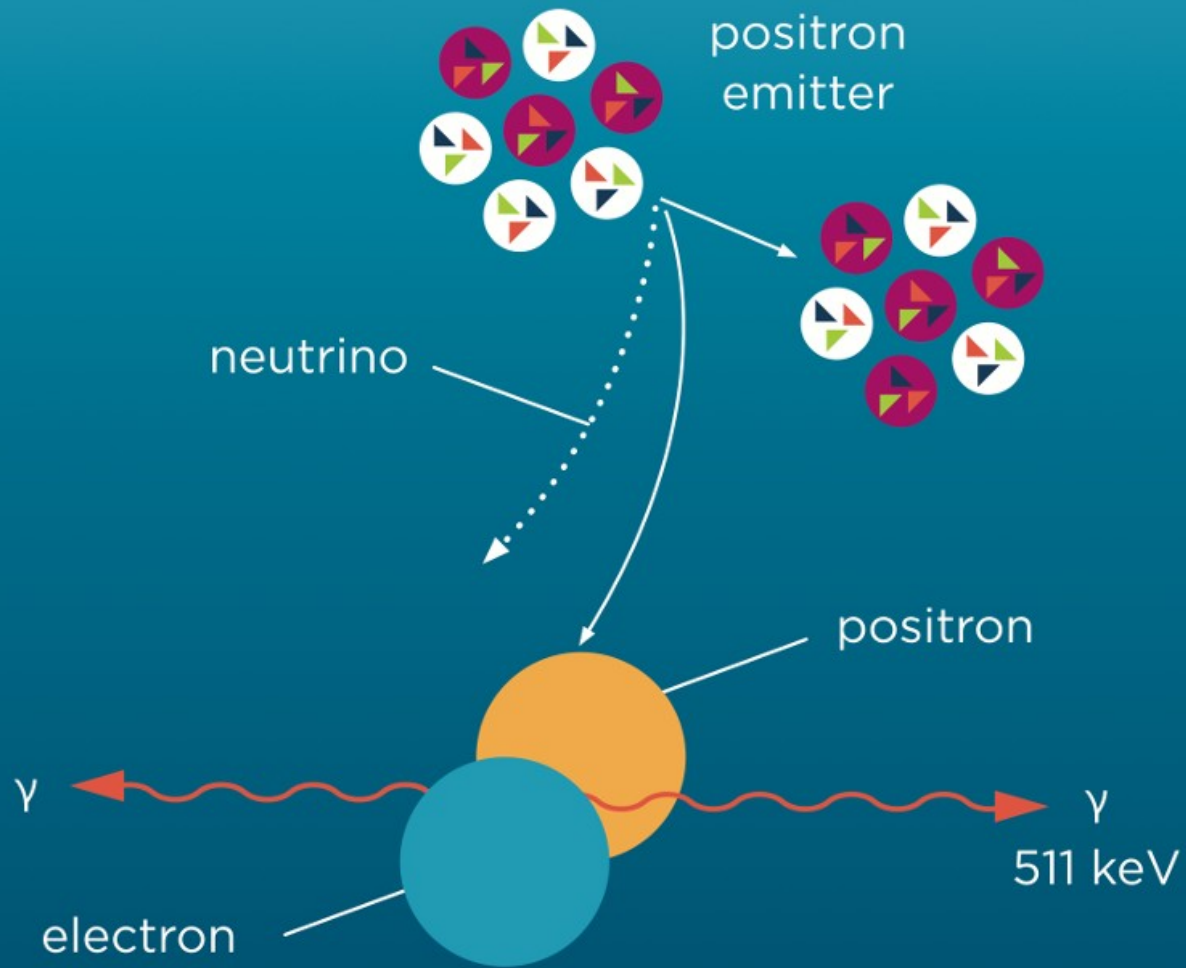
**El descubrimiento de la antimateria es probablemente el descubrimiento más importante del siglo XX.**

**Werner Heisenberg  
(uno que pasaba por allí)**





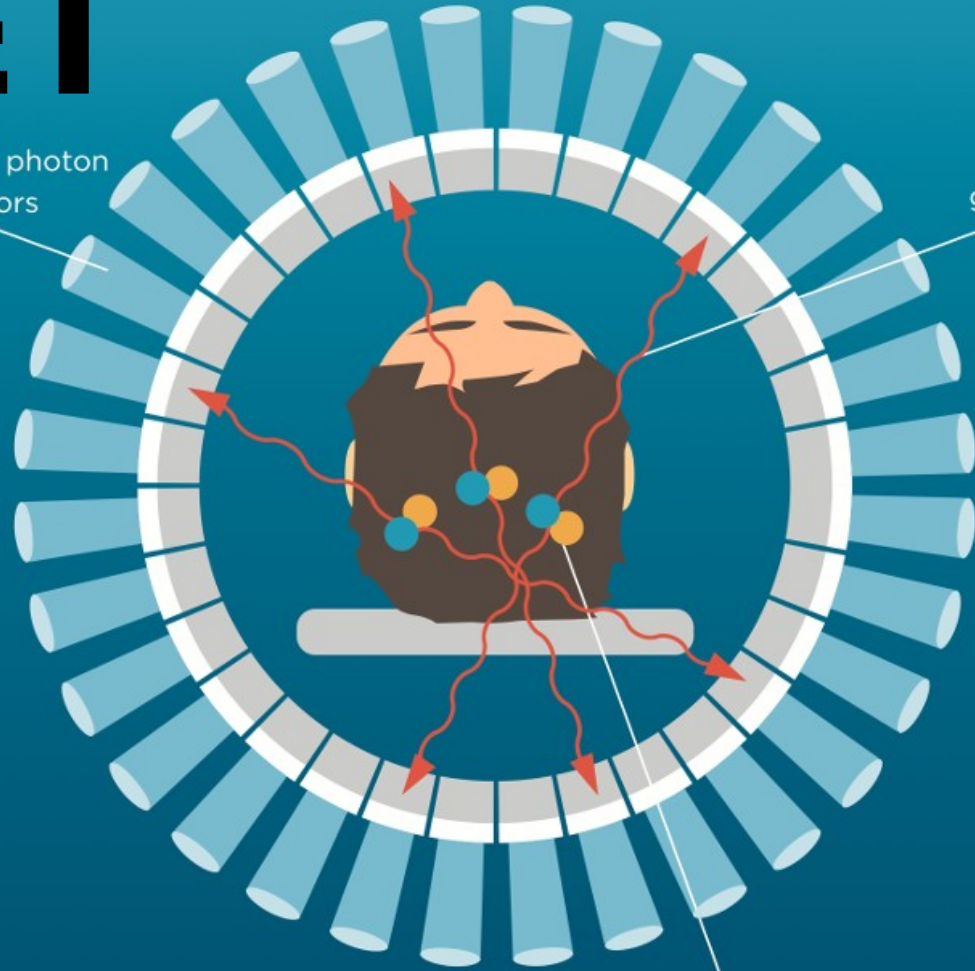




# PET

annihilation photon  
detectors

gamma rays  
created



positron-electron collision

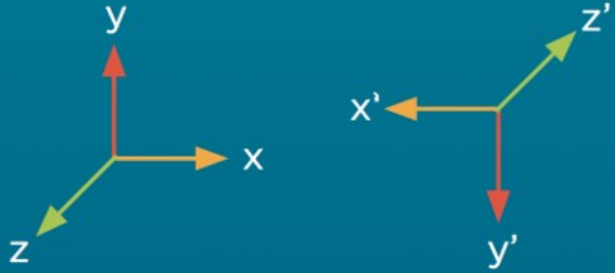
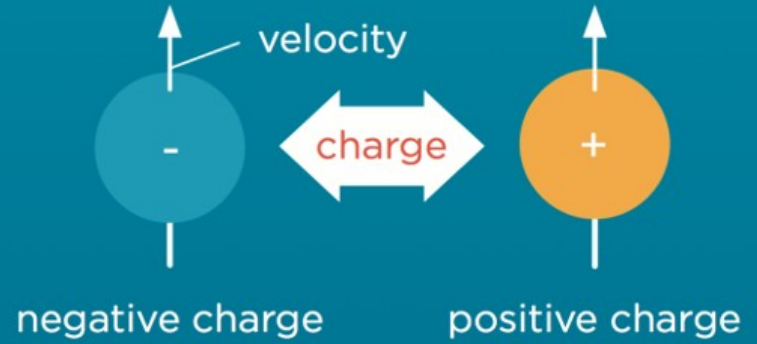


***¿DÓNDE ESTÁ TODA  
LA ANTIMATERIA?***



# C CHARGE

Charge conjugation swaps positive and negative charges



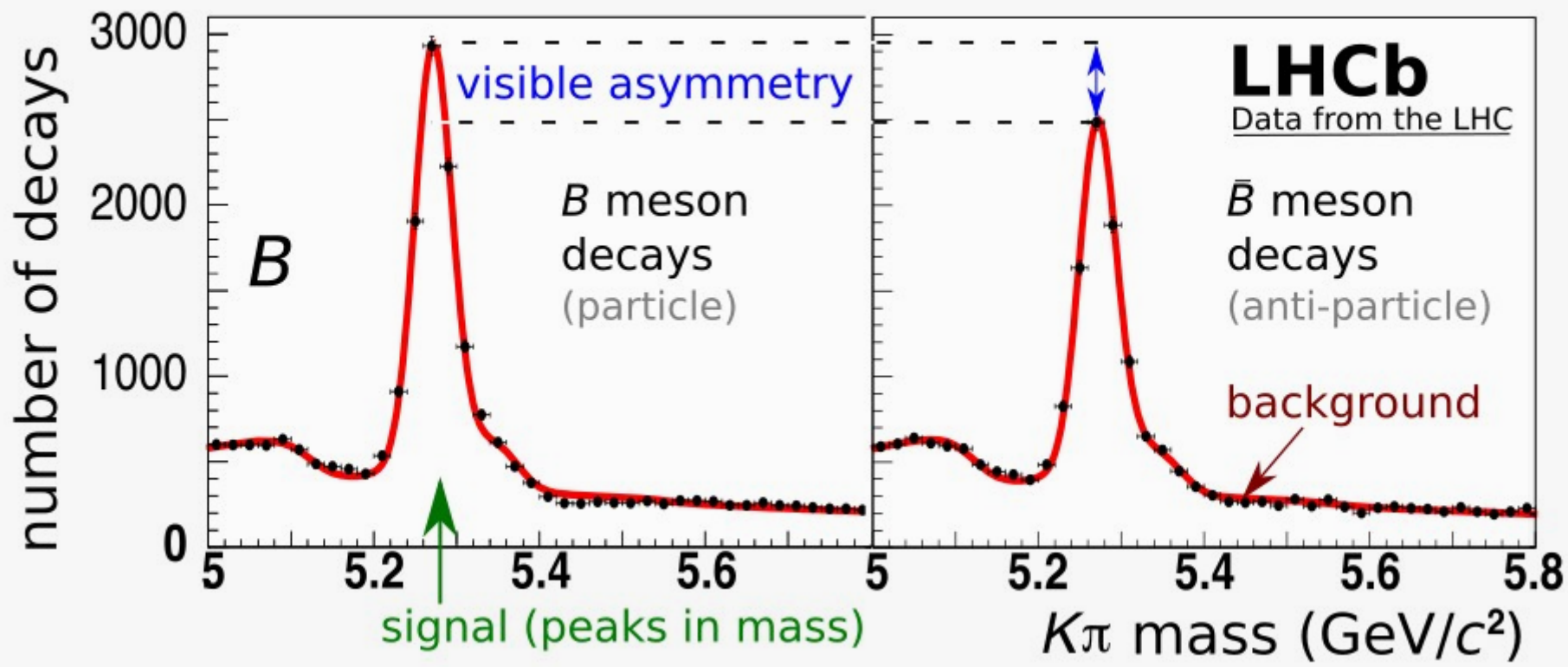
Parity reversal swaps up and down, left and right, forwards and backwards

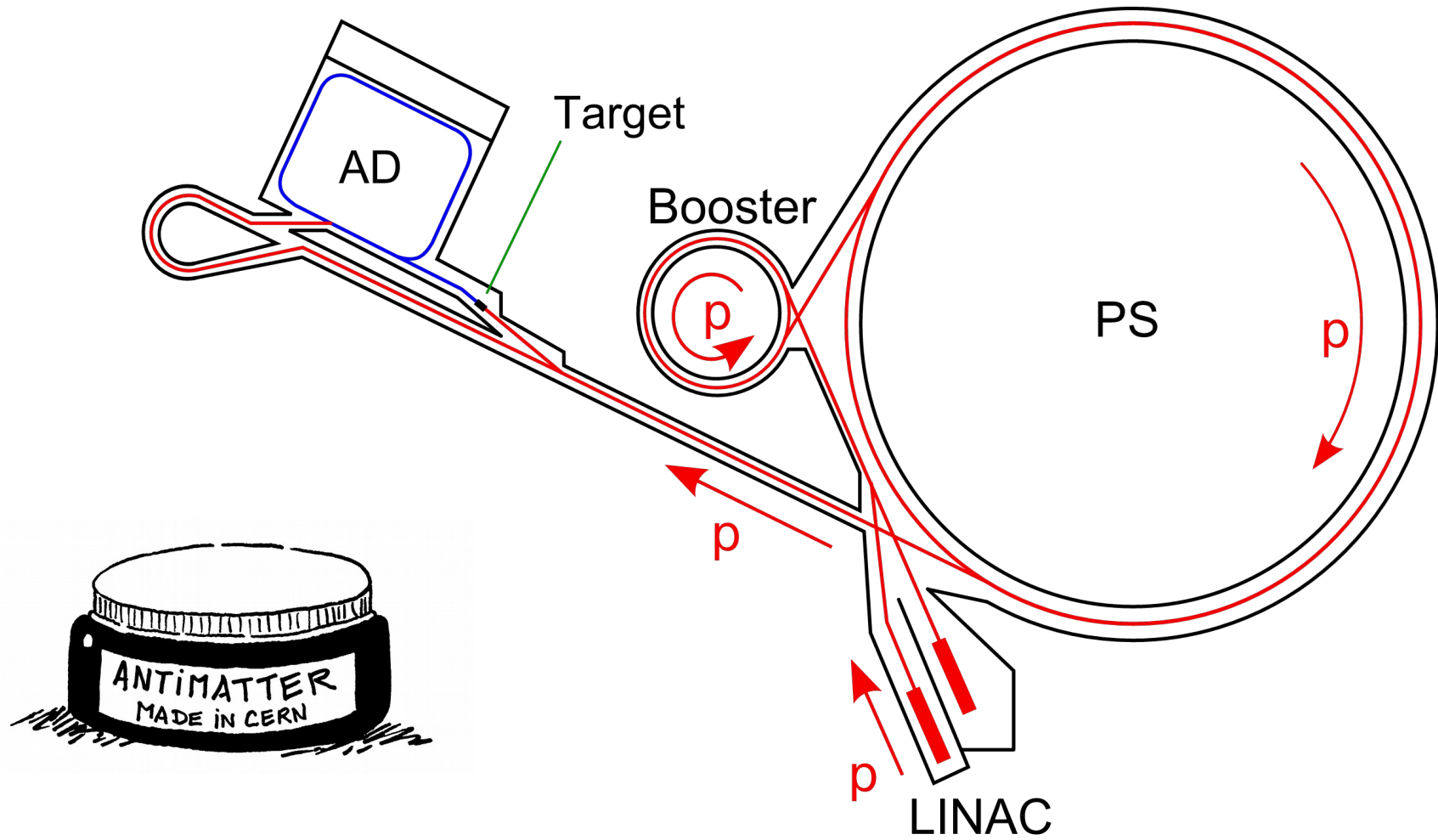
# P PARITY

# T TIME

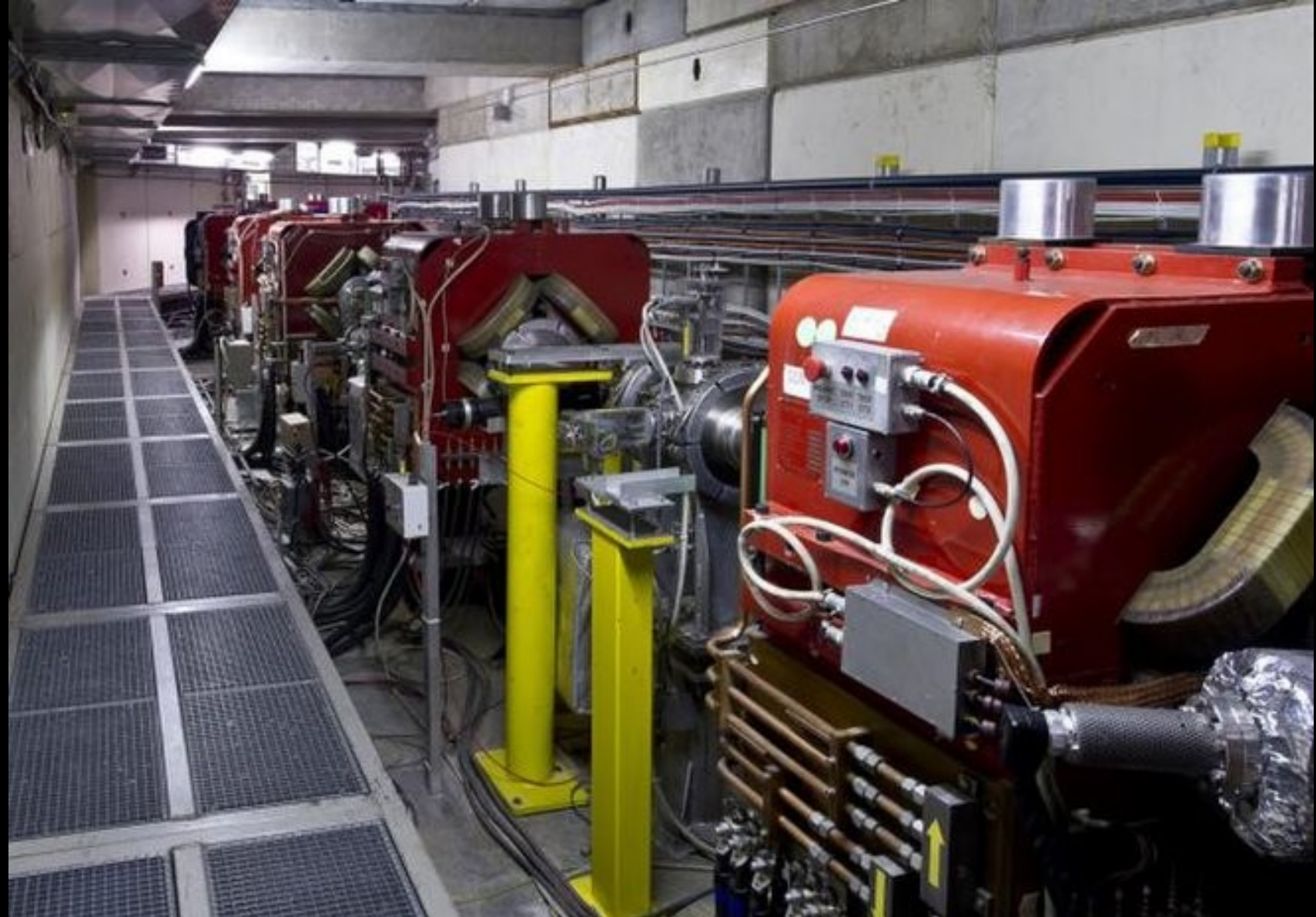
Time reversal swaps past and future

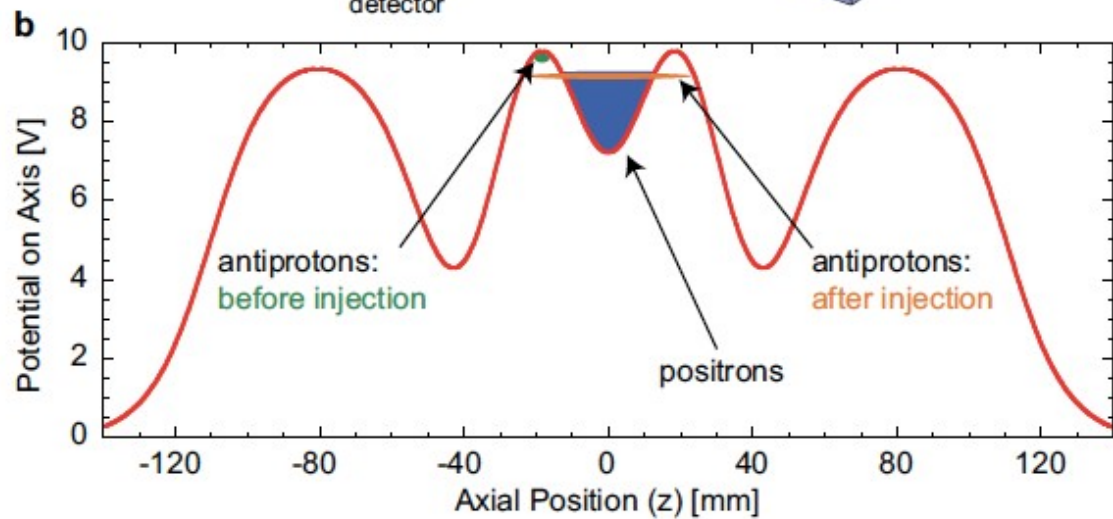
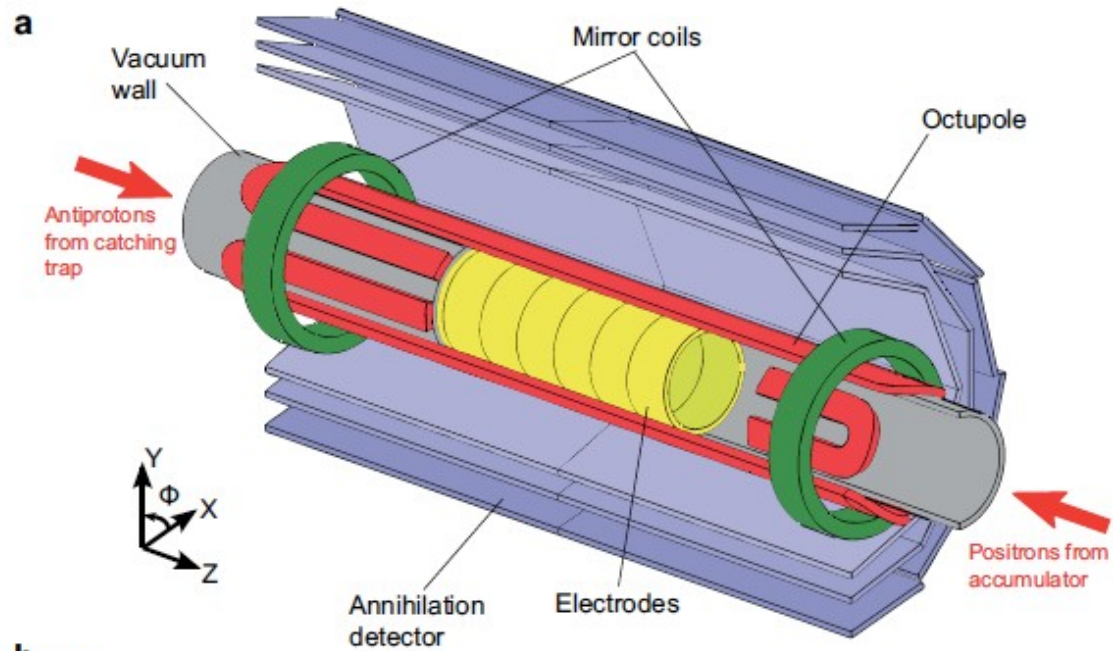












hidrògen

$e^{-}$



$H$

anti-hidrògen

$e^{+}$



$\bar{H}$







abc NEWS

IDENT OF THE



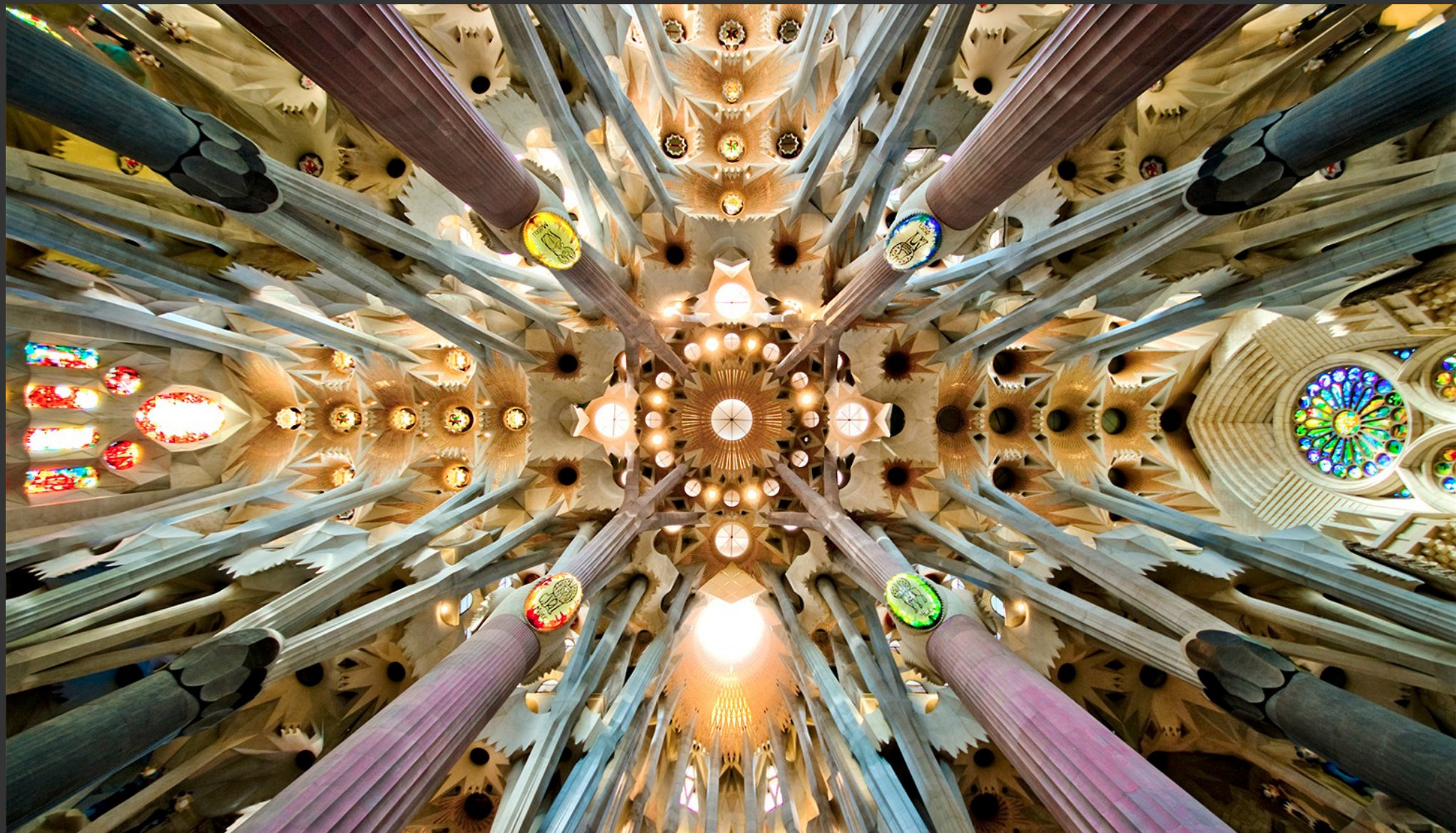
***FUTURAS APLICACIONES DE LA ANTIMATERIA***



**I DON'T DO MAGIC, I DO SCIENCE.**

**ONE TAKES BRAINS. THE  
OTHER TAKES DARK EYELINER.**









**MUCHAS GRACIAS!**