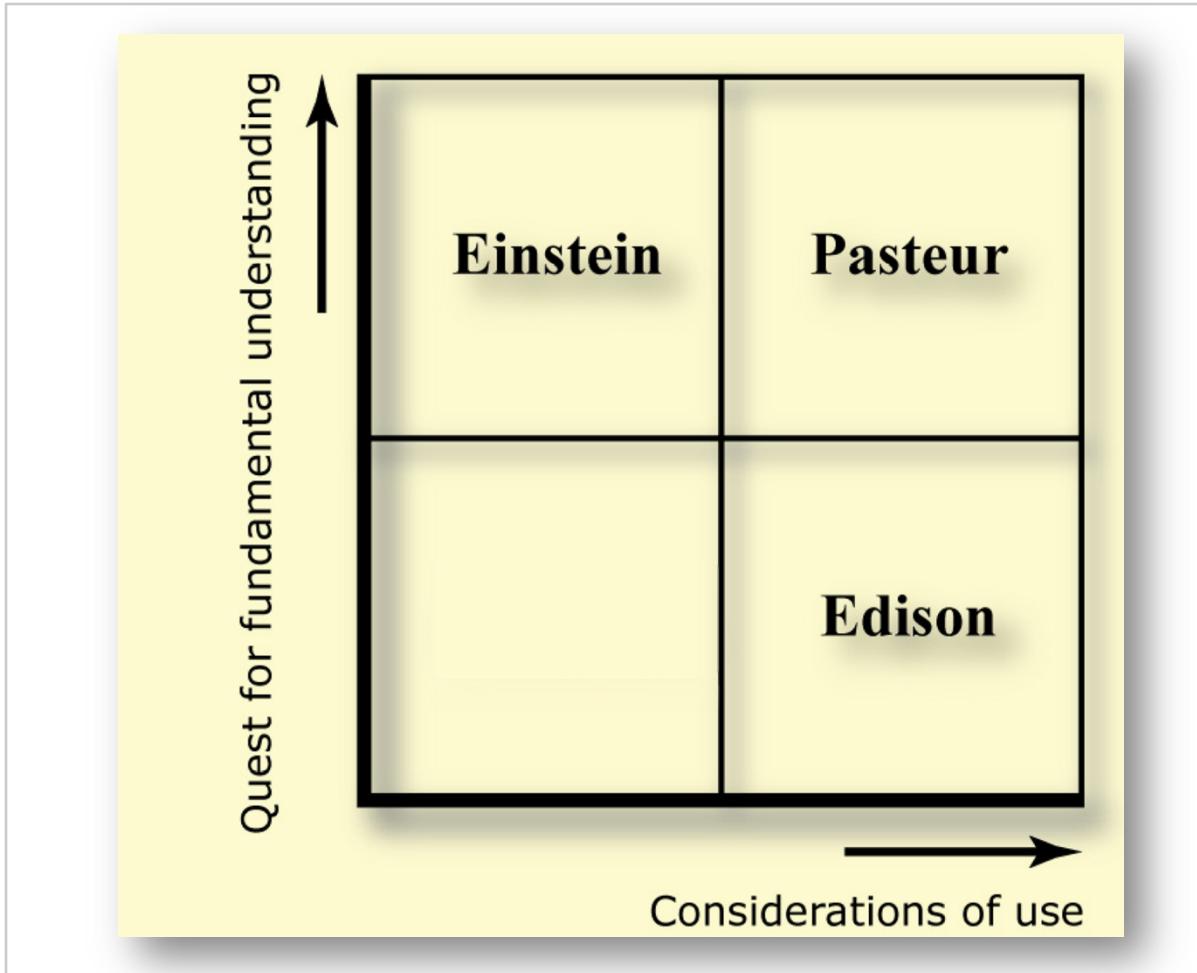


Fundamental Science Why – How – What for ?

May 2010 | Hans Ströher

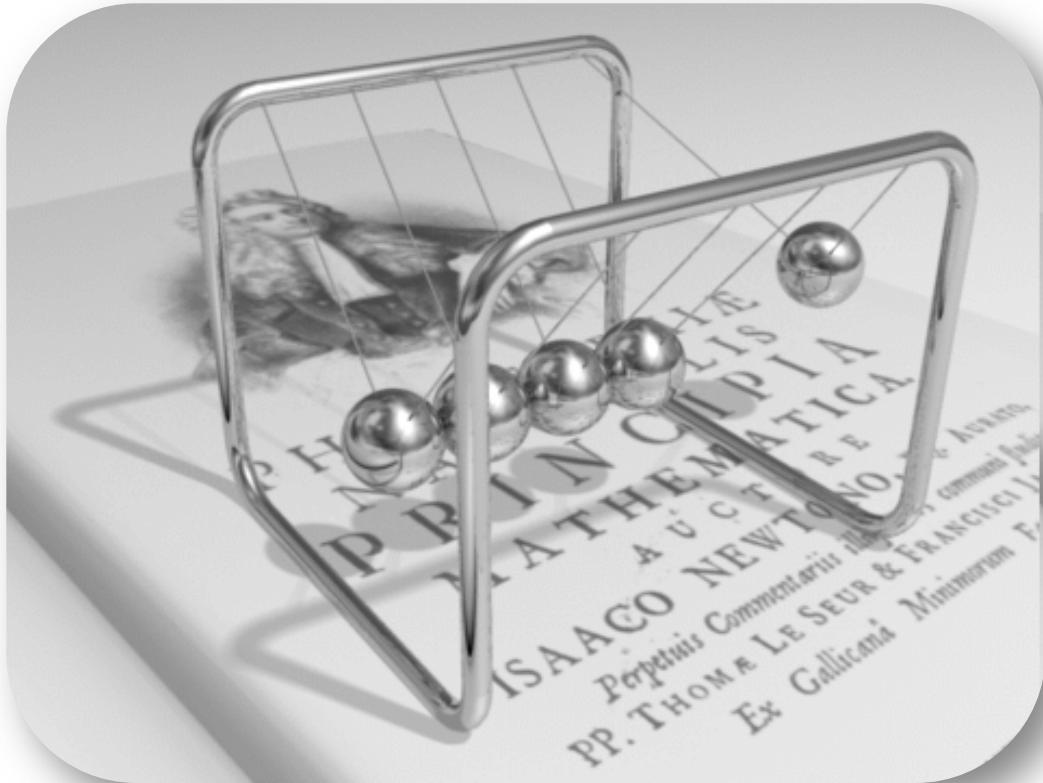
Fundamental Science – Definition



Fundamental Science – Why ?



Curiosity

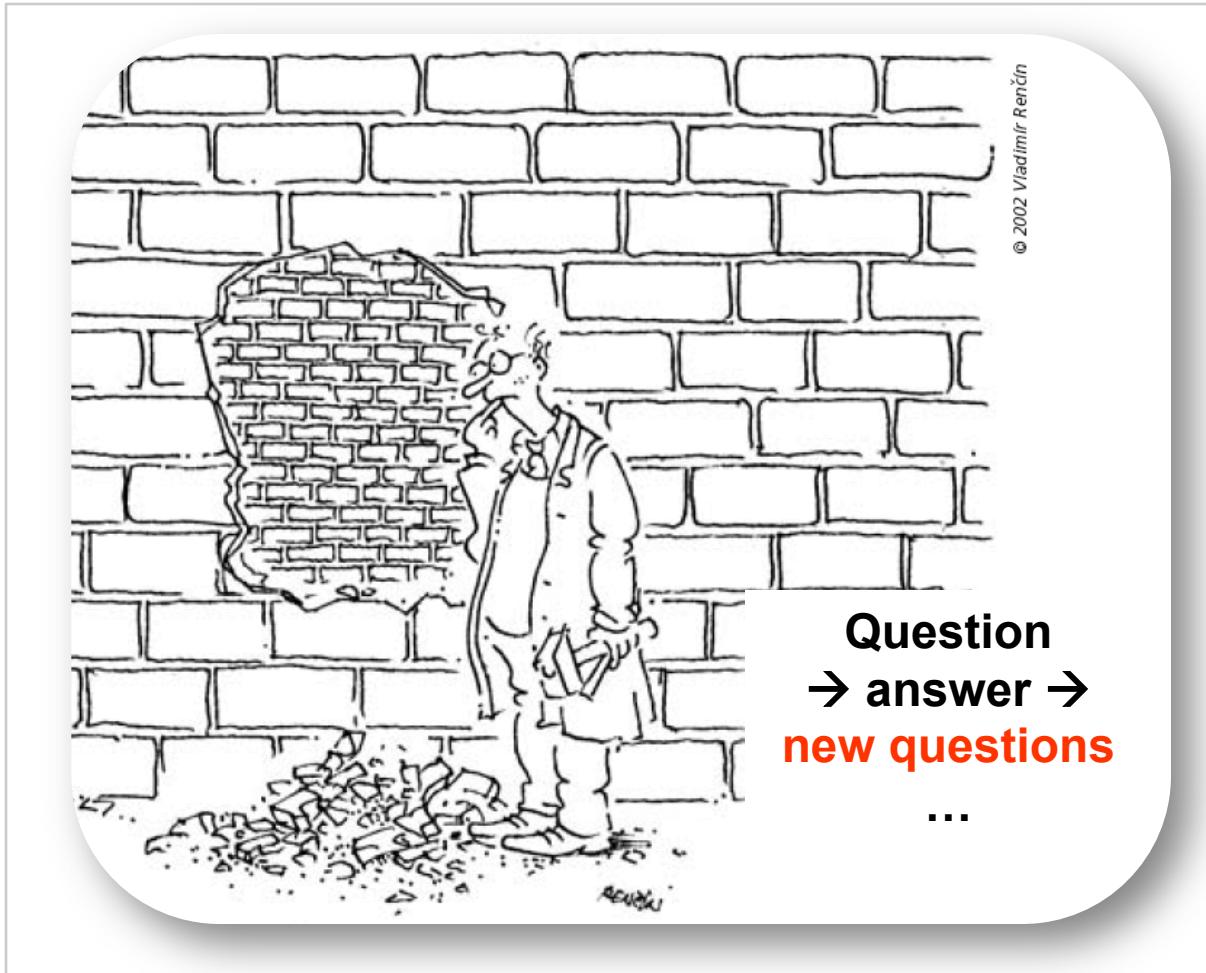


Understanding



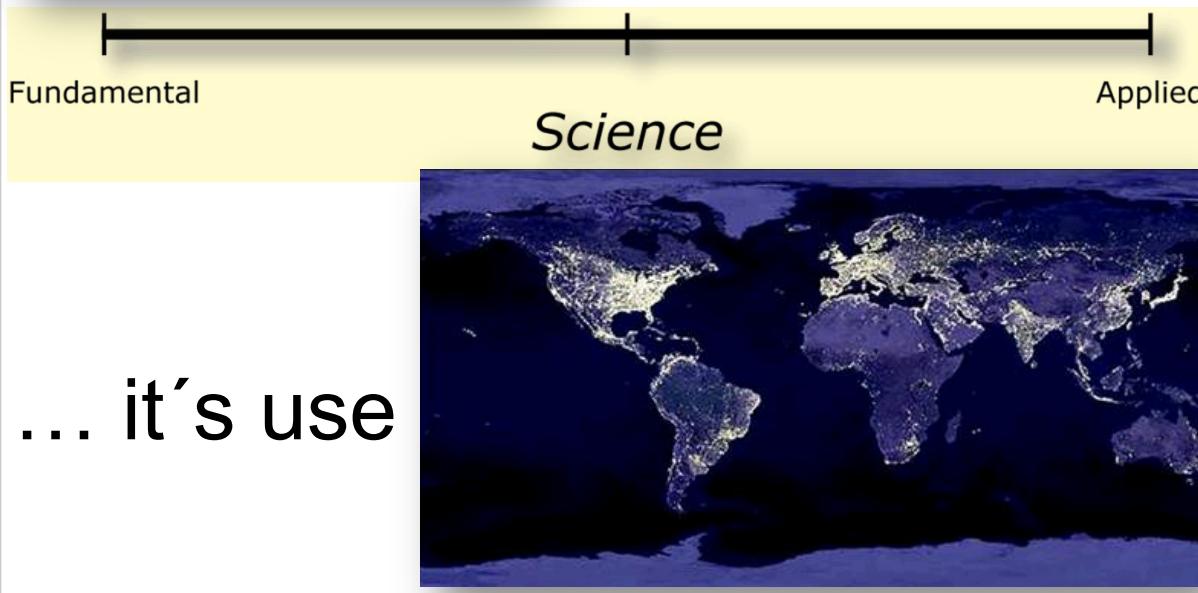
... on the shoulders of giants

Fundamental Science – How ?





Discovery ...



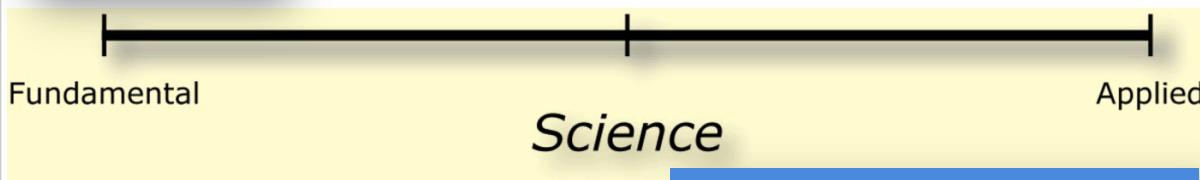
... it's use



„A laser is a solution...

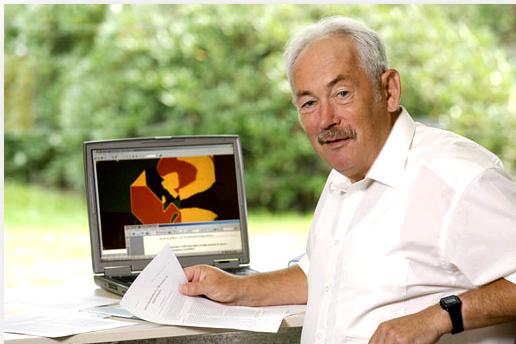
Discovery ...

...seeking a problem“

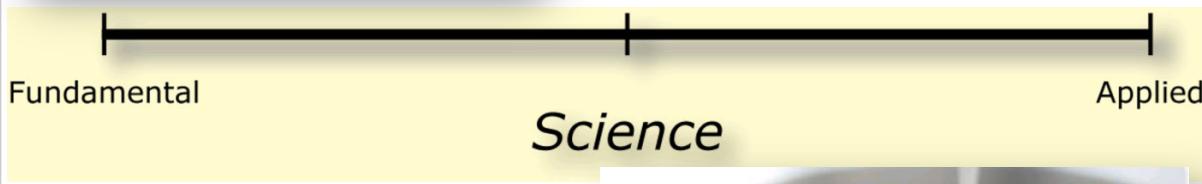


... it's use





Discovery ...



... it's use

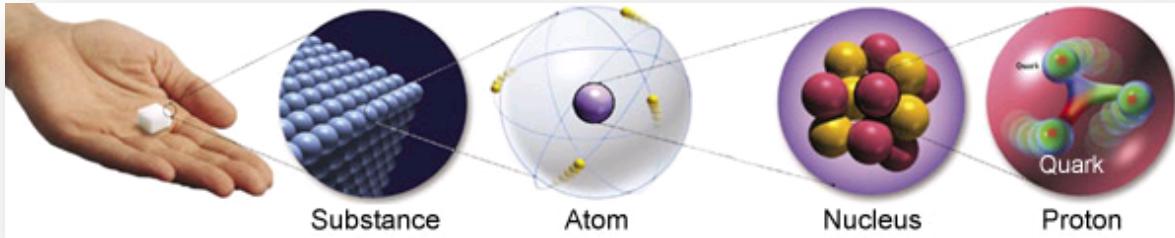


Fundamental Science – An Example



Structure of Matter

Constituents of Matter



Interactions



Fundamental Science – An Example

THE STANDARD MODEL						
	Fermions			Bosons		
	Quarks	u up	c charm	t top	γ photon	Z boson
Leptons	d down	s strange	b bottom	V_e electron neutrino	V_μ muon neutrino	V_τ tau neutrino
	e electron	μ muon	τ tau	W boson	g gluon	Higgs boson*

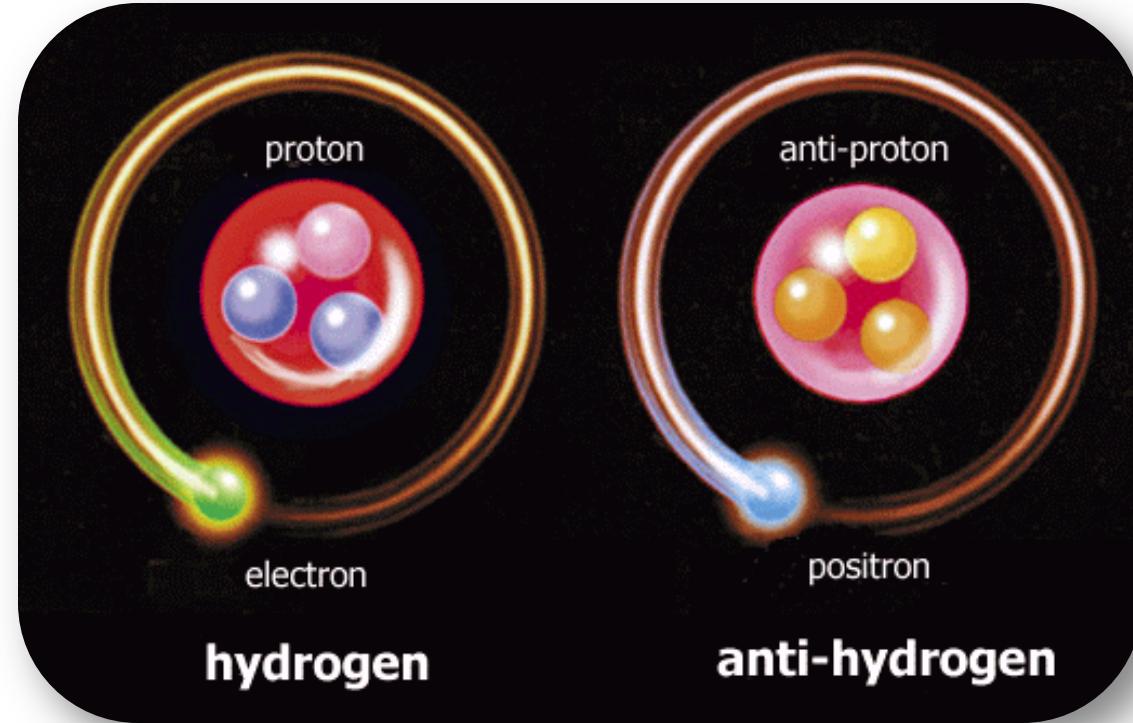
*Yet to be confirmed

Source: AAAS

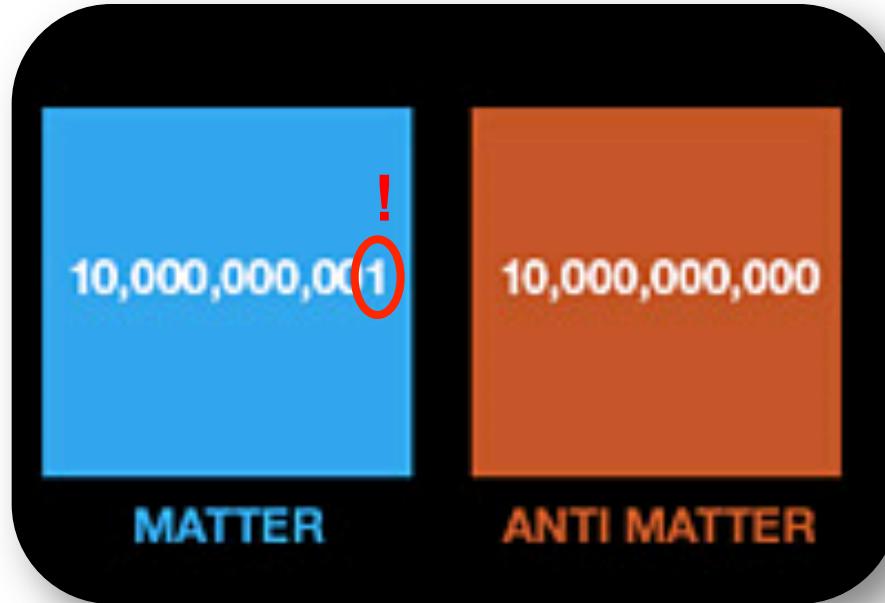
Standard Model



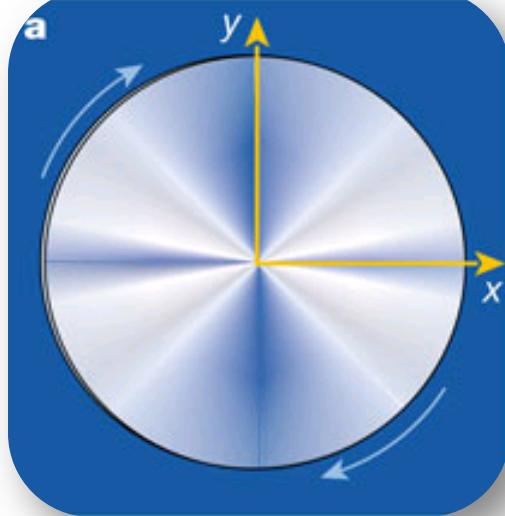
Universe is all matter?



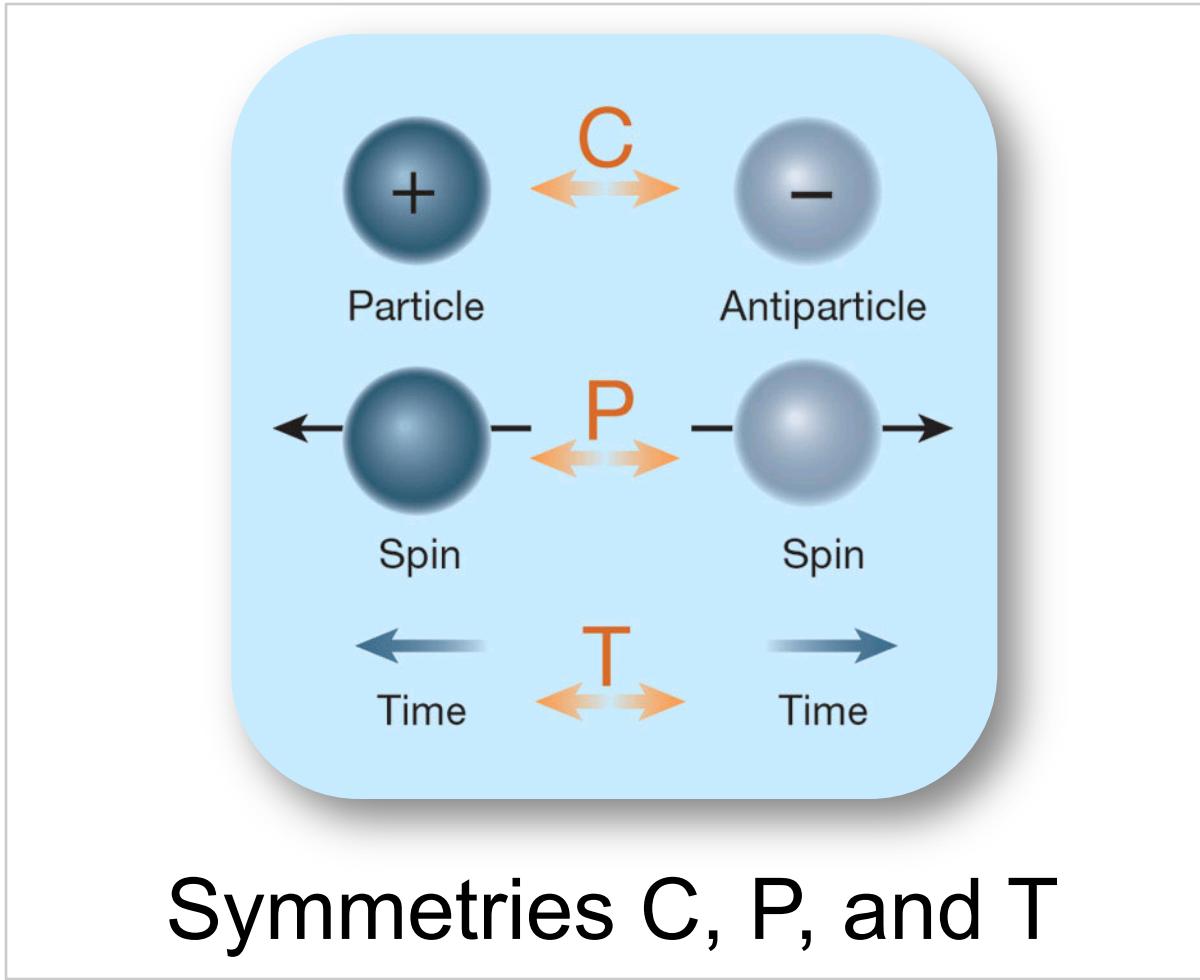
Where is the anti-matter?



Why do we exist at all?

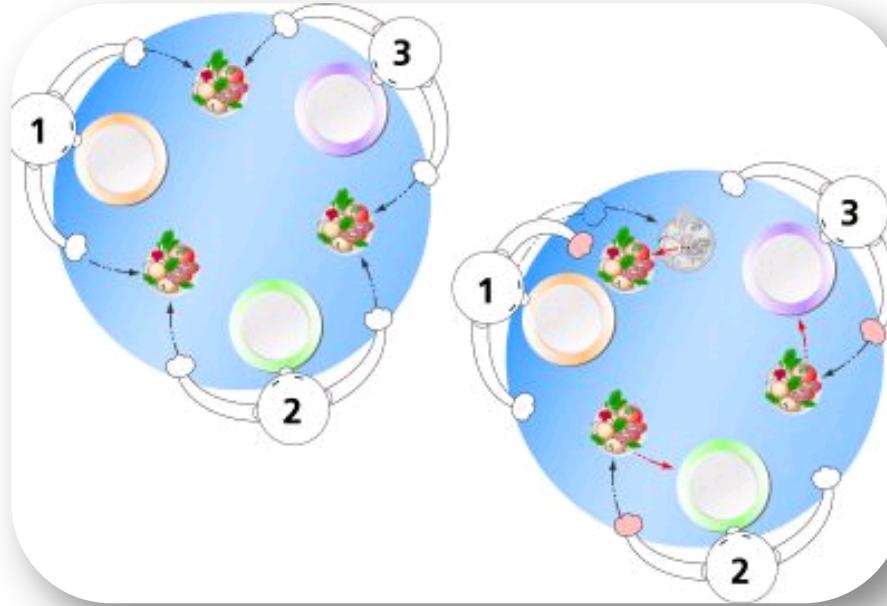


Continuous and discrete
symmetries in Nature





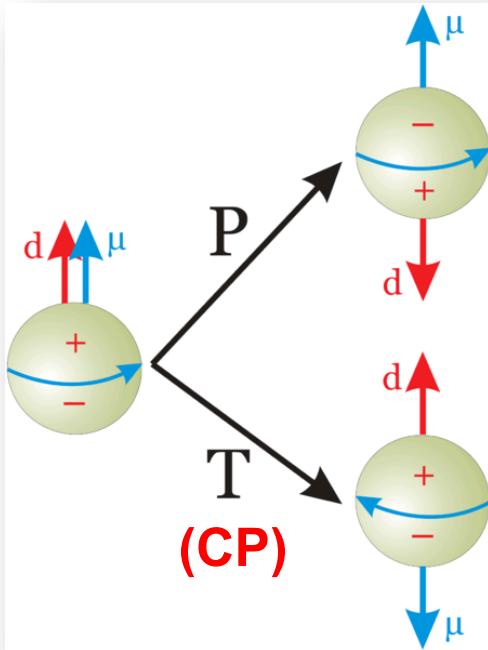
For perfect symmetries:
World = Anti-world



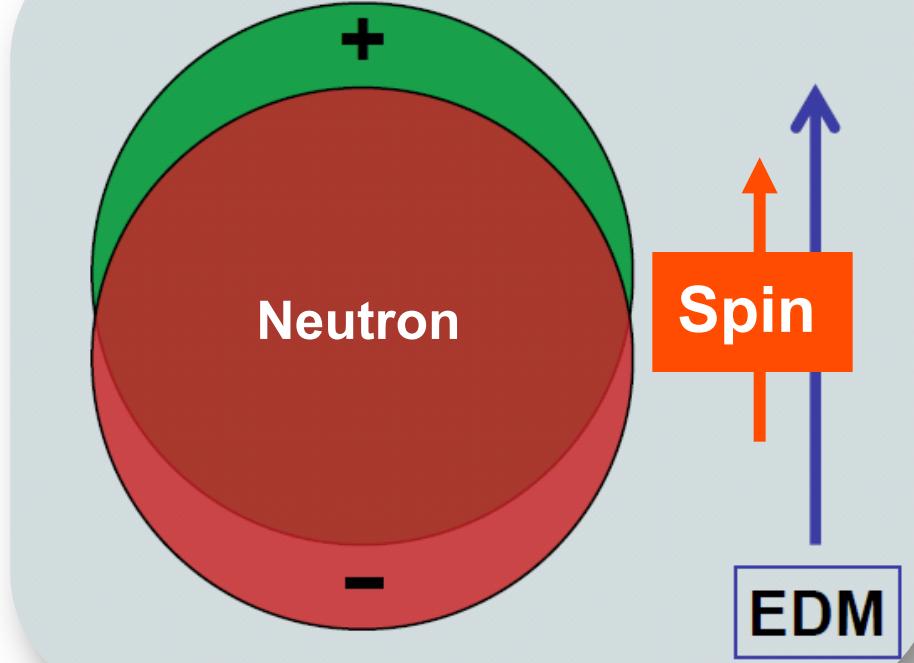
Need symmetry breaking for
World ~~X~~ Anti-world



CP-violation has been found!
But: **too small** to explain



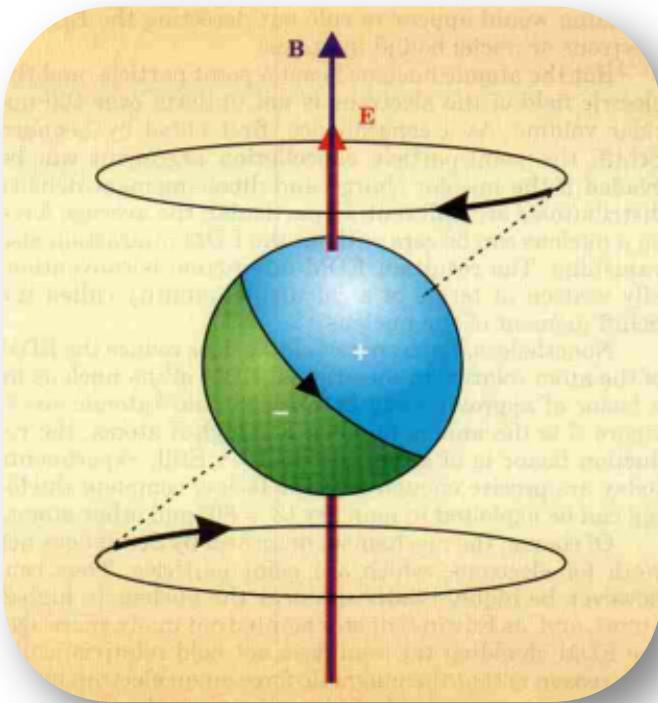
CP-violation also for
non-zero particle-EDM



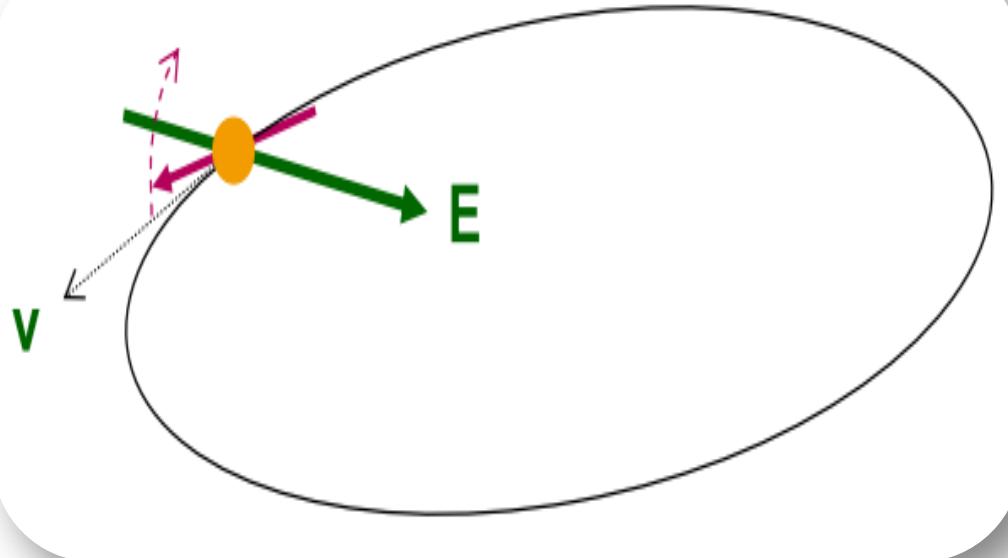
Electric Dipole Moment (EDM)



„Precession“ of a Spinning Top



Neutron in a „box“
nEDM (upper limit: $< 10^{-25}$ e cm)



pEDM search w/a Storage Ring
Time development of „spin“



COSY Storage Ring at FZJ

Finding a **finite EDM**
of a fundamental particle
would be a **MAJOR**
achievement,
though it would have
– most probably –
no practical application!

- The challenge for mankind to understand more and more of our world
- Without it, the modern world as we know it would not exist
- It is also a major thrust for innovation and economic success
- It is fun !



Thank you very much
for your attention!

