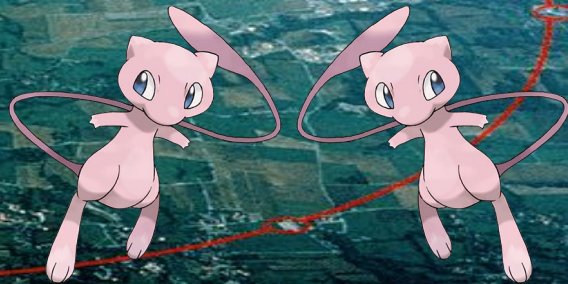
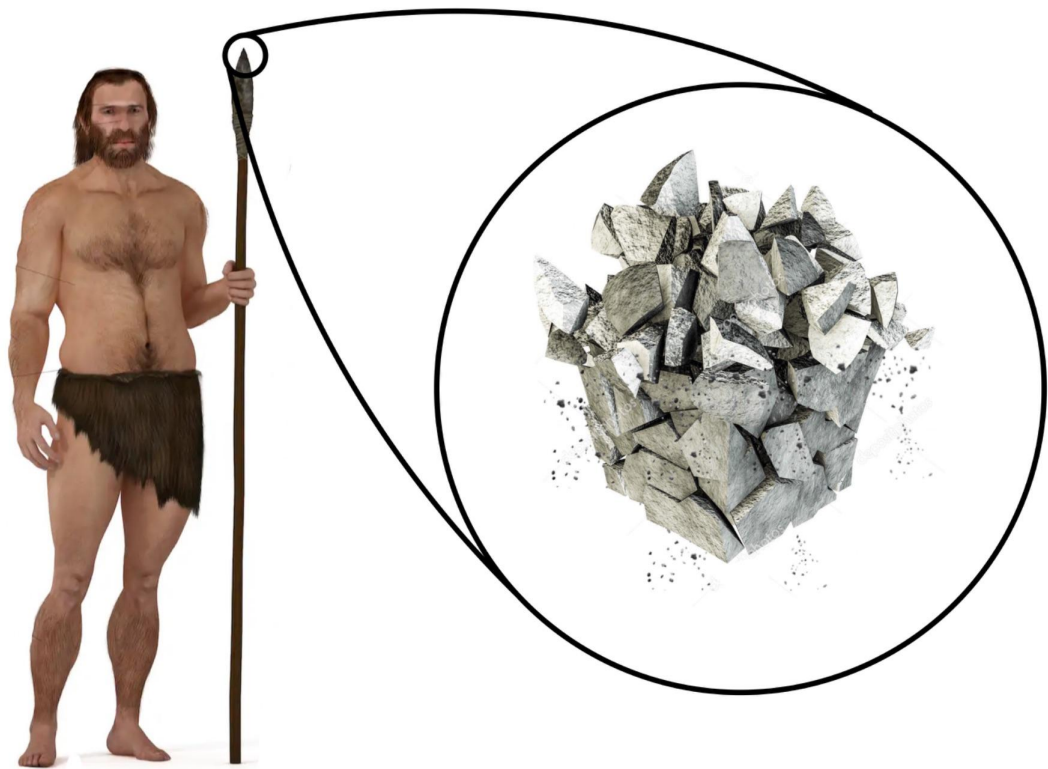
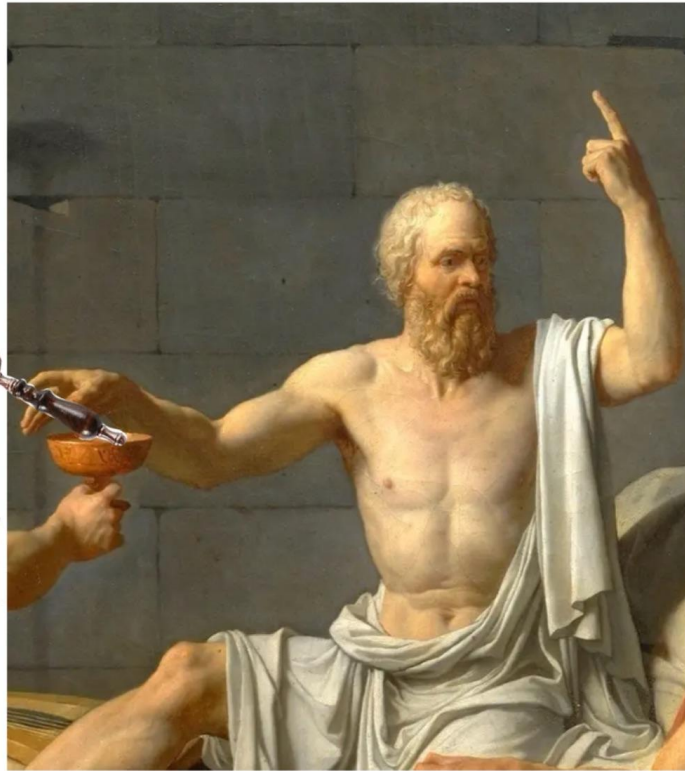


$H \rightarrow \mu\mu$ & the Higgs mechanism
GROUP B



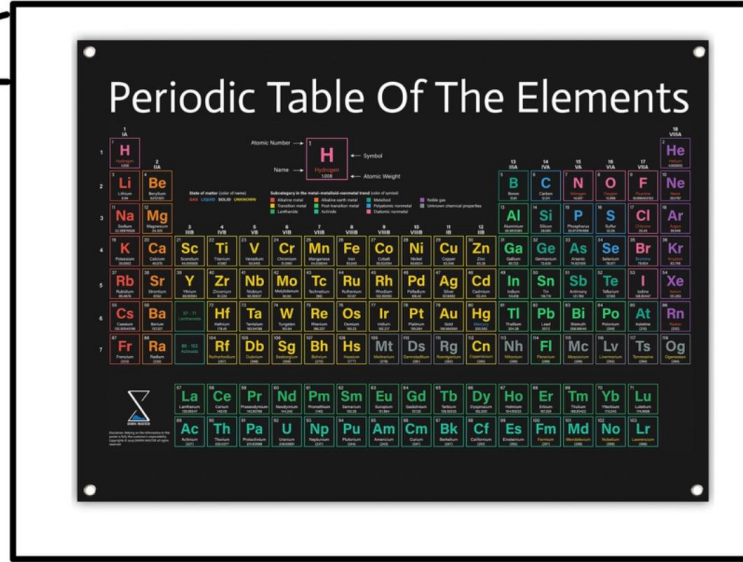
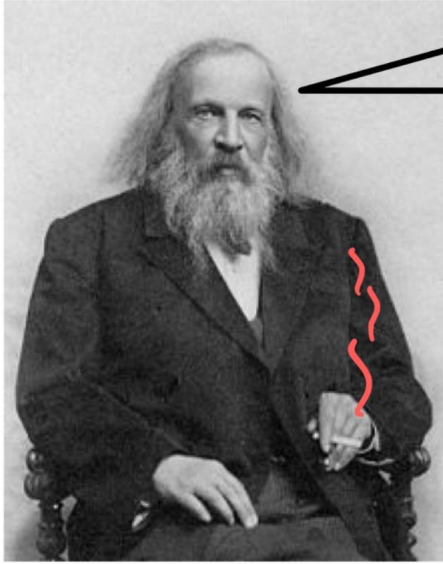


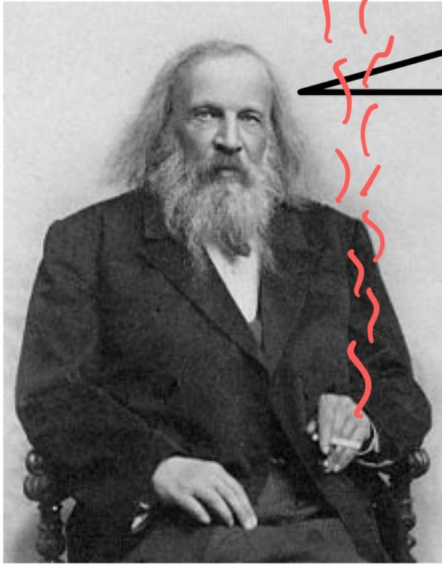




ἄτομος





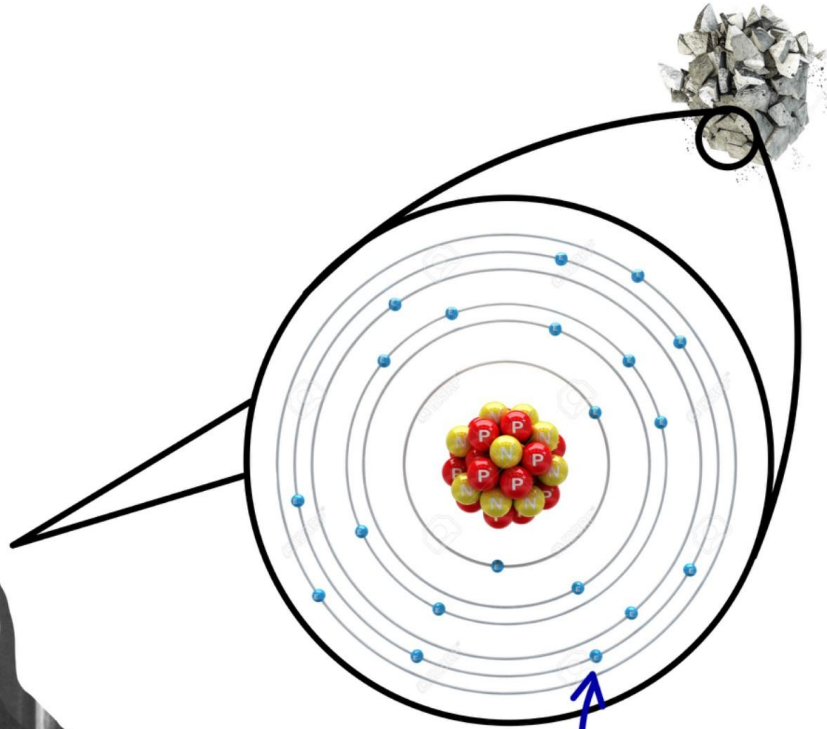


Periodic Table Of The Elements

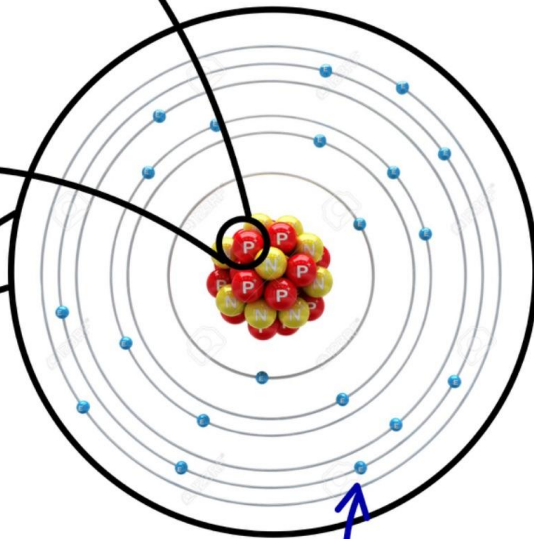
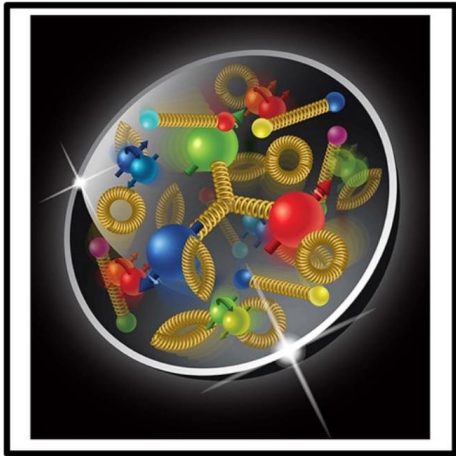
A color-coded periodic table of elements on a black background. The elements are arranged in rows and columns, with their atomic numbers, symbols, and names. A red box highlights Hydrogen (H) at the top left. A white oval highlights Calcium (Ca) in the second row, second column. A white line connects the oval to a magnified view of calcium metal at the bottom.

Atomic Number	Symbol	Name	Atomic Weight
1	H	Hydrogen	1.008
2	He	Helium	4.003
3	Li	Lithium	6.941
4	Be	Beryllium	9.012
5	B	Boron	10.811
6	C	Carbon	12.011
7	N	Nitrogen	14.007
8	O	Oxygen	15.999
9	F	Fluorine	18.998
10	Ne	Neon	20.180
11	Na	Sodium	22.990
12	Mg	Magnesium	24.305
13	Al	Aluminum	26.982
14	Si	Silicon	28.086
15	P	Phosphorus	30.974
16	S	Sulfur	32.065
17	Cl	Chlorine	35.453
18	Ar	Argon	39.948
19	K	Potassium	39.098
20	Ca	Calcium	40.078
21	Sc	Scandium	44.956
22	Ti	Titanium	47.883
23	V	Vanadium	50.942
24	Cr	Chromium	51.996
25	Mn	Manganese	54.938
26	Fe	Iron	55.845
27	Co	Cobalt	58.933
28	Ni	Nickel	58.693
29	Cu	Copper	63.546
30	Zn	Zinc	65.38
31	Ga	Gallium	69.723
32	Ge	Germanium	72.630
33	As	Arsenic	74.922
34	Se	Selenium	78.96
35	Br	Bromine	79.904
36	Kr	Krypton	83.80
37	Rb	Rubidium	85.468
38	Sr	Strontium	87.62
39	Y	Yttrium	88.906
40	Zr	Zirconium	91.224
41	Nb	Niobium	92.906
42	Mo	Molybdenum	95.94
43	Tc	Technetium	98
44	Ru	Ruthenium	101.07
45	Rh	Rhodium	102.91
46	Pd	Palladium	106.42
47	Ag	Silver	107.87
48	Cd	Cadmium	112.41
49	In	Indium	114.82
50	Sn	Tin	118.71
51	Sb	Antimony	121.76
52	Te	Tellurium	127.6
53	I	Iodine	126.90
54	Xe	Xenon	131.29
55	Cs	Cesium	132.91
56	Ba	Barium	137.33
57	La	Lanthanum	138.91
58	Ce	Cerium	140.12
59	Pr	Praseodymium	140.91
60	Nd	Niodymium	144.24
61	Pm	Promethium	145
62	Sm	Samarium	150.36
63	Eu	Europium	151.96
64	Gd	Gadolinium	157.25
65	Tb	Terbium	158.93
66	Dy	Dysprosium	162.50
67	Ho	Holmium	164.93
68	Er	Erbium	167.26
69	Tm	Thulium	168.93
70	Yb	Ytterbium	173.05
71	Lu	Lutetium	174.97
72	Hf	Hafnium	178.49
73	Ta	Tantalum	180.95
74	W	Tungsten	183.84
75	Re	Rhenium	186.21
76	Os	Osmium	190.23
77	Ir	Iridium	192.22
78	Pt	Platinum	195.08
79	Au	Gold	196.97
80	Hg	Mercury	200.59
81	Tl	Thallium	204.38
82	Pb	Lead	207.2
83	Bi	Bismuth	208.98
84	Po	Polonium	209
85	At	Astatine	210
86	Rn	Radon	222
87	Fr	Francium	223
88	Ra	Radium	226
89	Ac	Actinium	227
90	Th	Thorium	232.04
91	Pa	Protactinium	231.04
92	U	Uranium	238.03
93	Np	Neptunium	237
94	Pu	Plutonium	244
95	Am	Americium	243
96	Cm	Curium	247
97	Bk	Berkelium	247
98	Cf	Californium	251
99	Es	Einsteinium	252
100	Fm	Fermium	257
101	Md	Mendelevium	258
102	No	Nobelium	259
103	Lr	Lutetium	262
104	Rf	Rutherfordium	261
105	Db	Dubnium	262
106	Sg	Seaborgium	266
107	Bh	Berkelium	264
108	Hs	Hassium	265
109	Mt	Mendelevium	268
110	Ds	Darmstadtium	271
111	Rg	Rutherfordium	272
112	Cn	Copernicium	285
113	Nh	Nihonium	284
114	Fl	Flerovium	289
115	Mc	Moscovium	288
116	Lv	Livermorium	293
117	Ts	Tennessine	289
118	Og	Oganesson	294



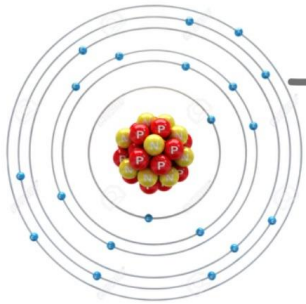
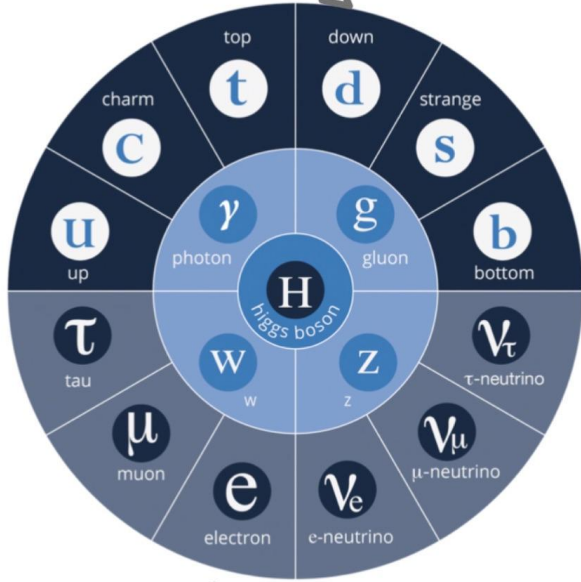


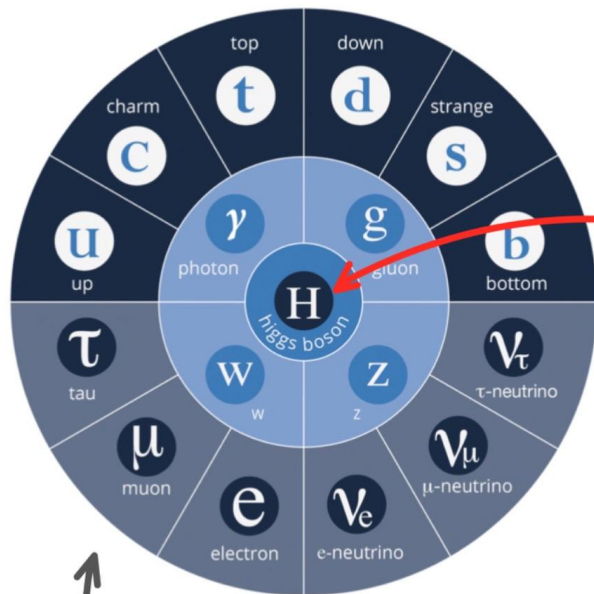
electron



electron

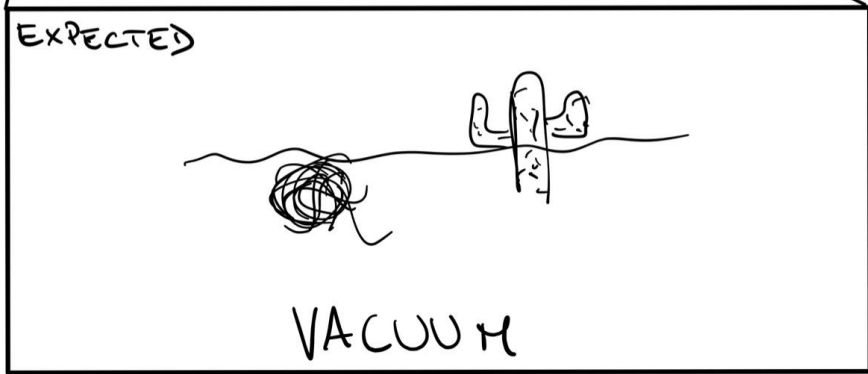
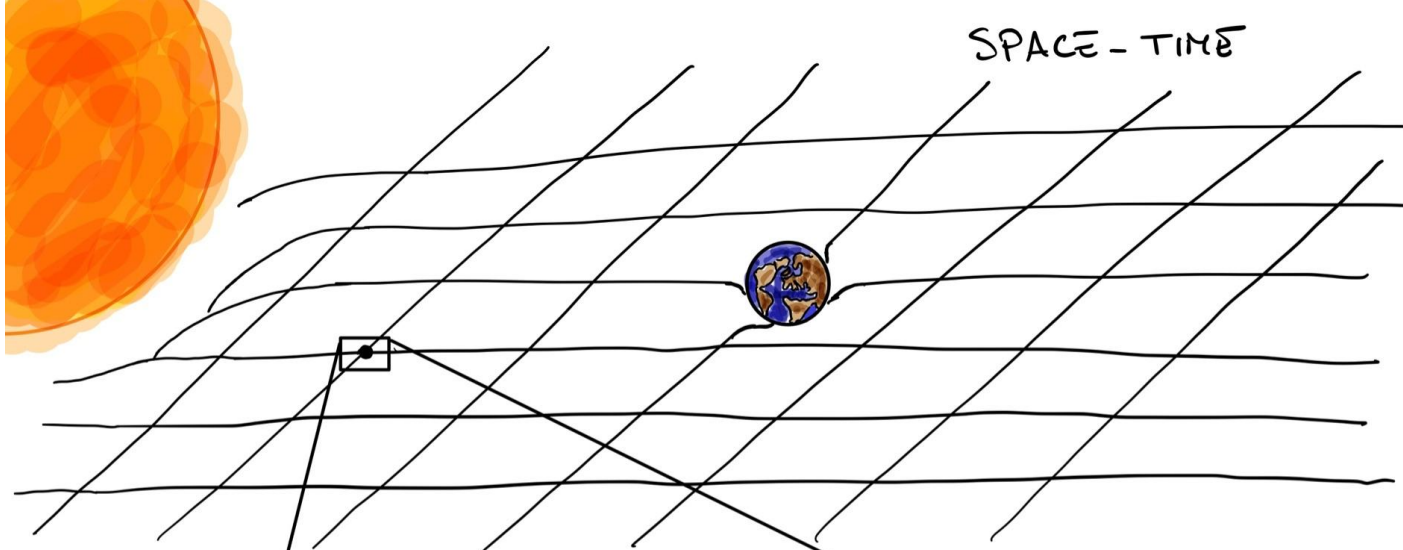




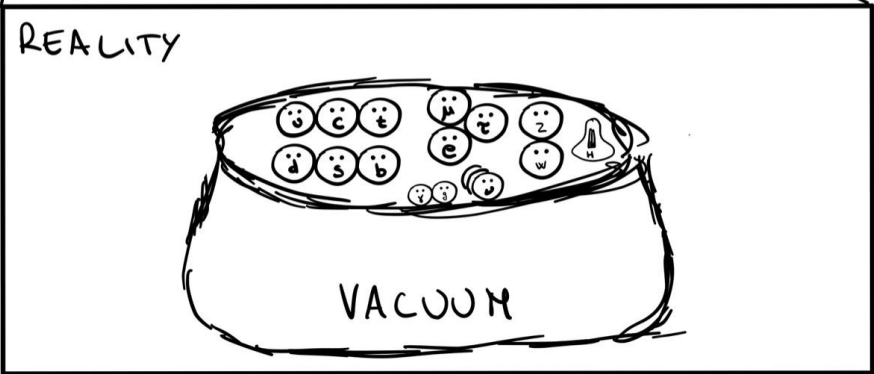
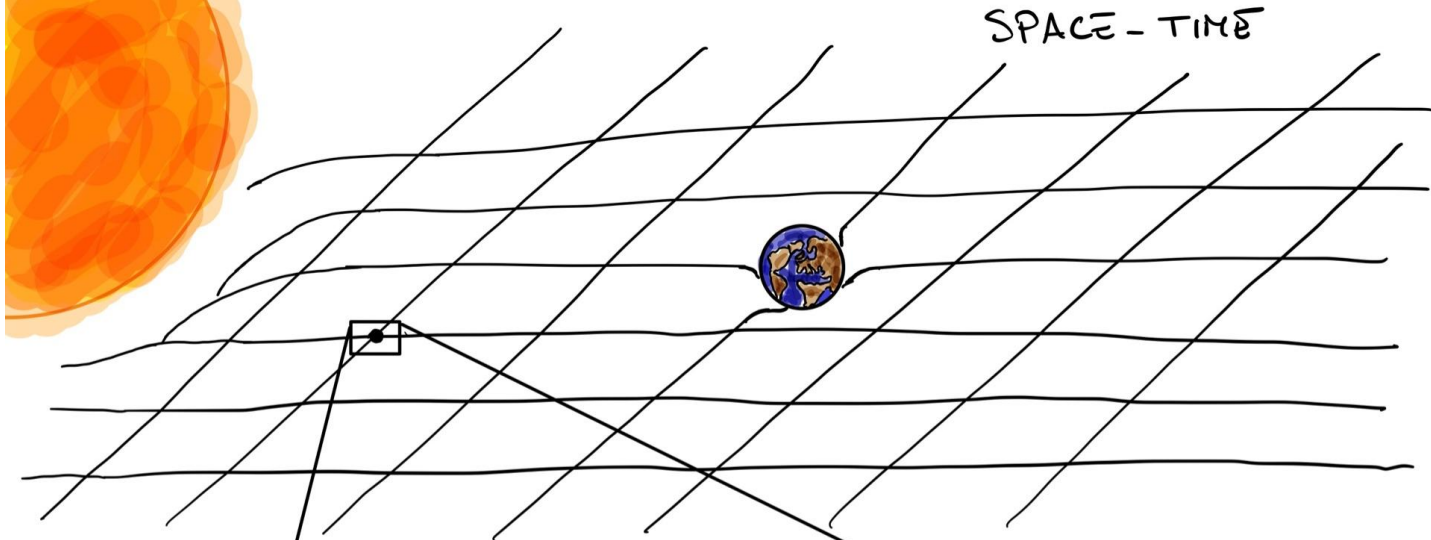


Cartoon Time..



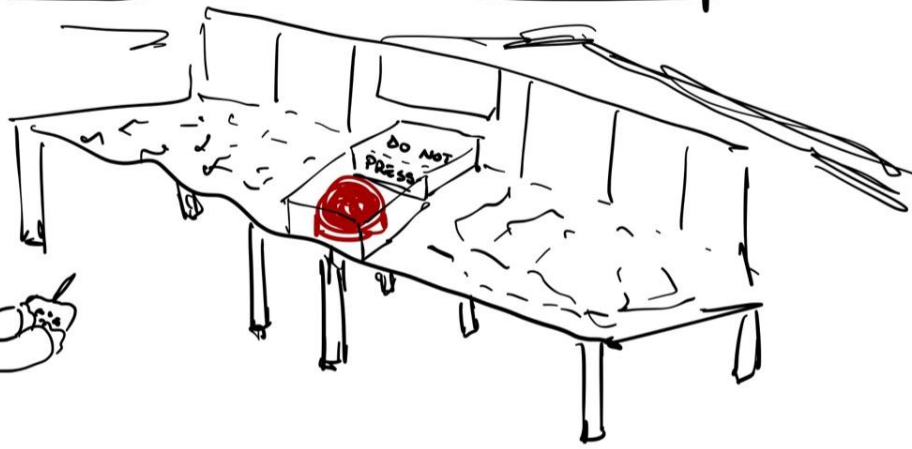


SPACE - TIME

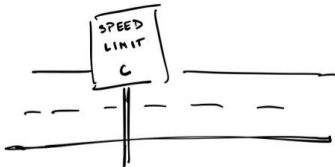


SOMEWHERE
IN GENEVA...

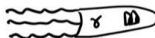
LHC STATUS Σ 13.6 TeV PROTONS	25 / 12 / 22 01:00 AM	ATLAS COLLISIONS	CMS COLLISIONS
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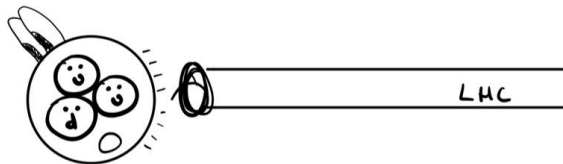
IN THE MEANTIME
a 100 mt UNDERGROUND



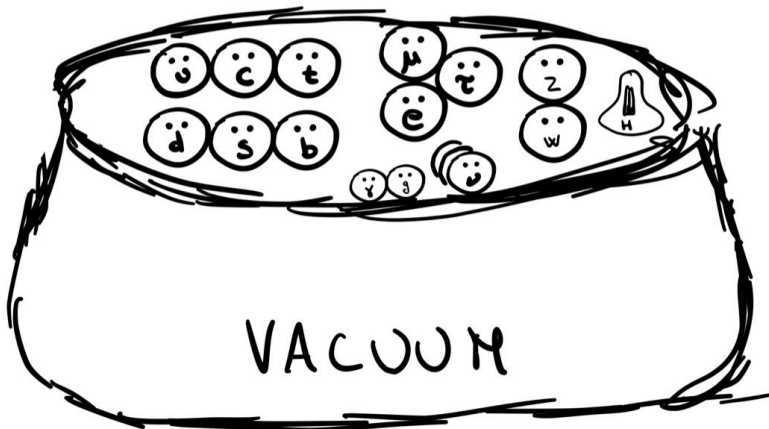
YOU'RE SO
FAST TO BE
A PROTON...

A small, simple drawing of a particle, possibly a photon or a neutrino, with a wavy tail and a small circle at the end.

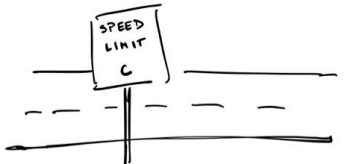
THEY ACCELERATED
US TO REACH
YOUR SPEED



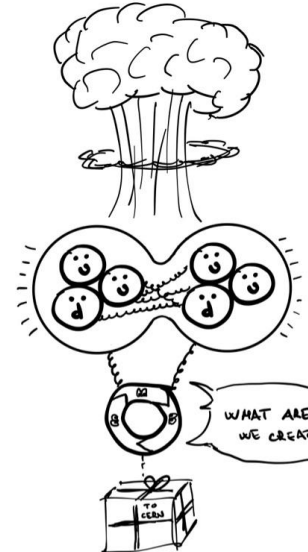
OH... WE ARE
SMASHING!



LHC

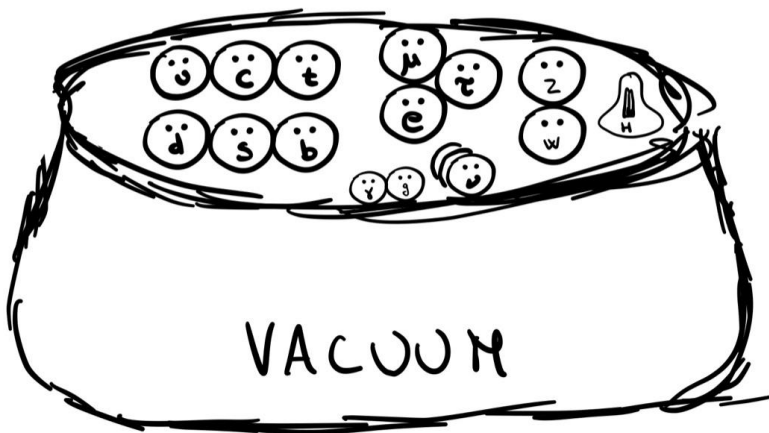


BOOM



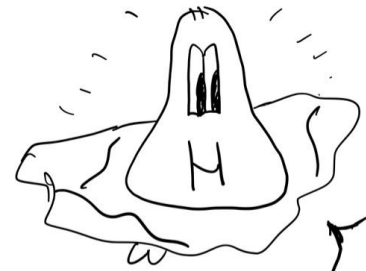
WHAT ARE WE CREATING?

LHC



VACUUM

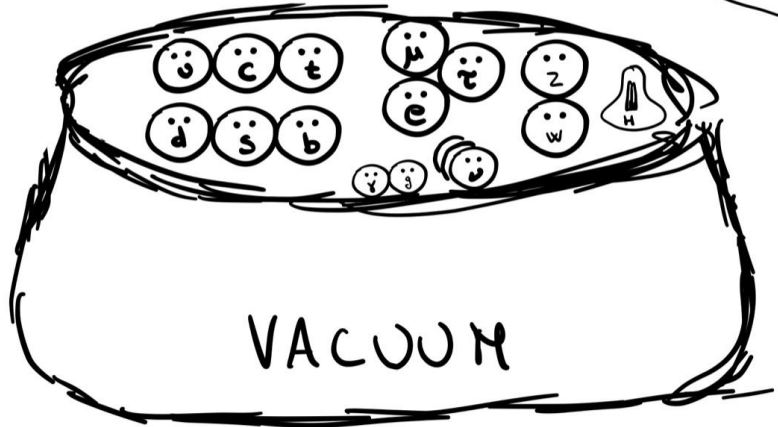
LHC



LHC

ET VOILÁ!
I'M THE HIGGS
BOSON

LOOK HOW
MANY PARTICLES
I CAN PICK
FROM VACUUM

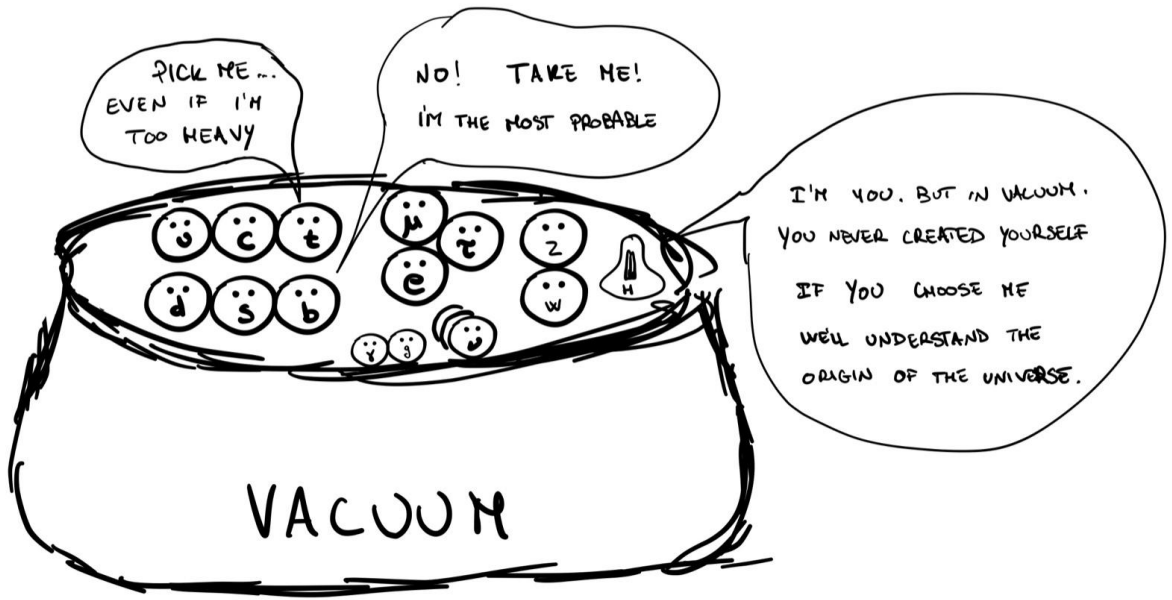


VACUUM

LHC



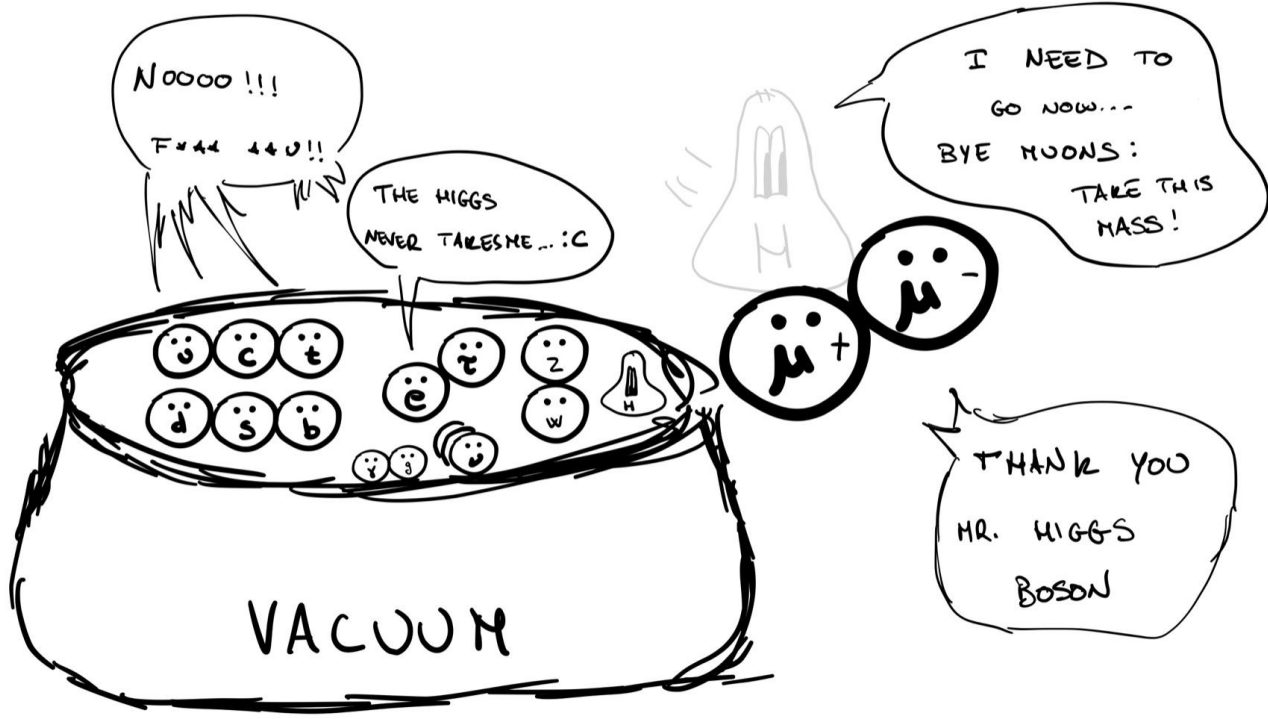
LHC



LHC

NEEEEEEXT!

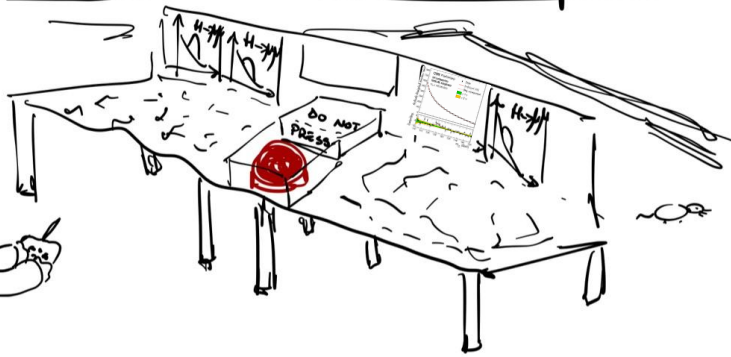
LHC



IN THE LAB

...

LHC STATUS	25 / 12 / 25	ATLAS	CMS
$\sqrt{s} = 13.6 \text{ TeV}$	01:00 AM	COLLISIONS	COLLISIONS
PROTONS ☺	☺	☺	☺



I CANNOT BELIEVE IT ...

WE JUST SAW THE HIGGS
DECAYING TO MUONS ... IT NEVER HAPPENED!

MAYBE IT IS JUST
A FLUCTUATION
LET'S CALL FABIOLA!

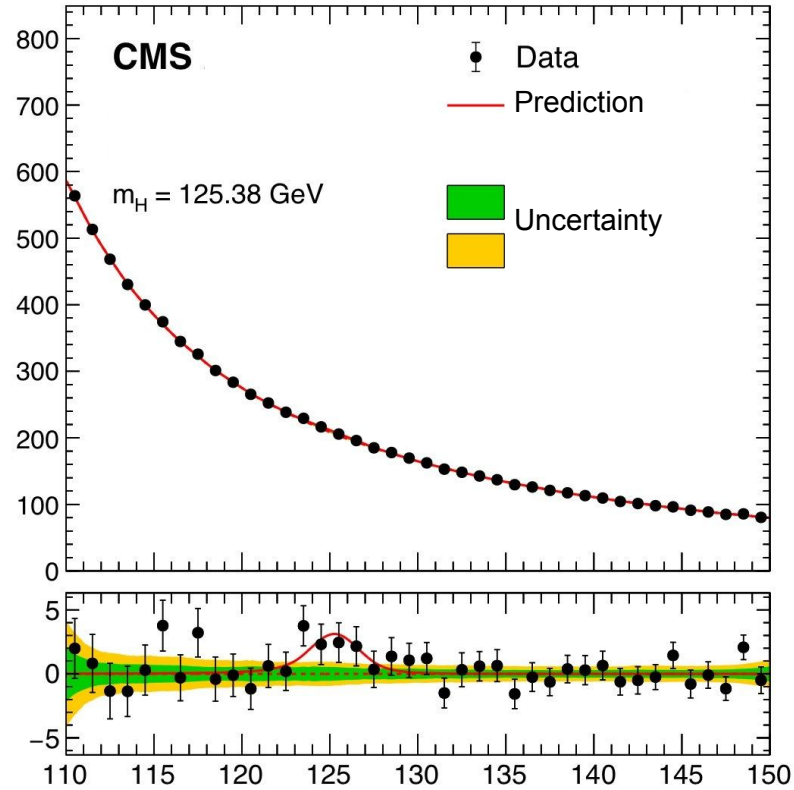
THE END



And Peter was right....

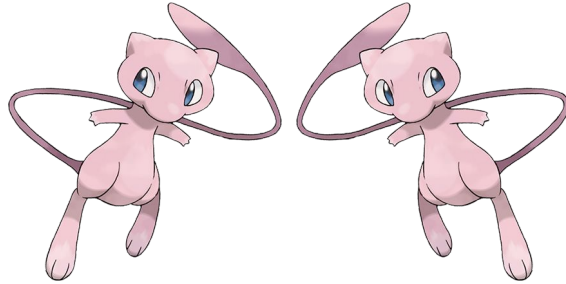
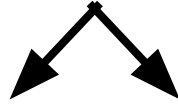
Thank you for your attention!

number of events



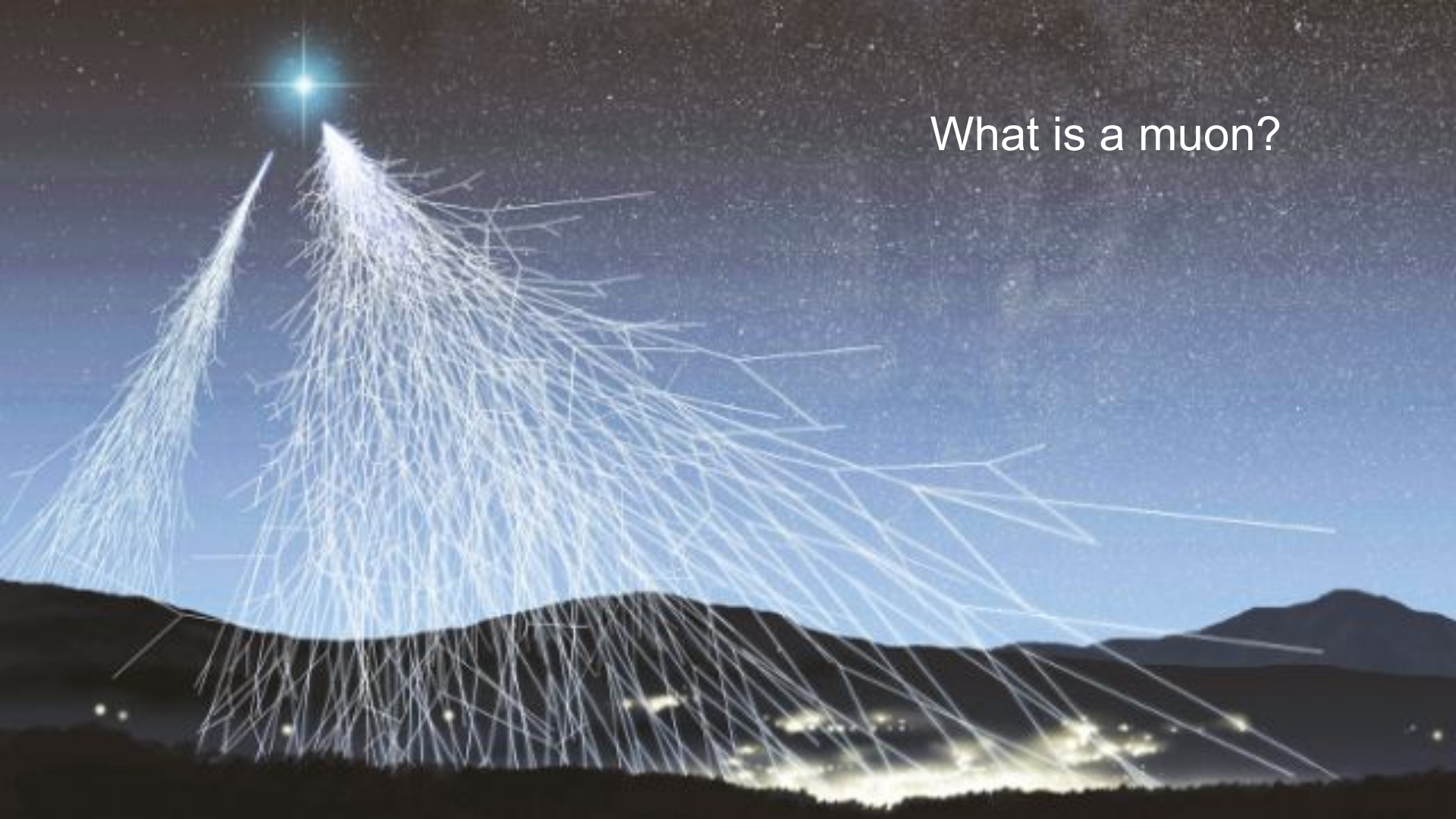
data - background

reconstructed mass of Higgs boson (from muons) [GeV]



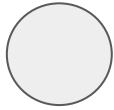
Backup

What is a muon?



What is a muon?

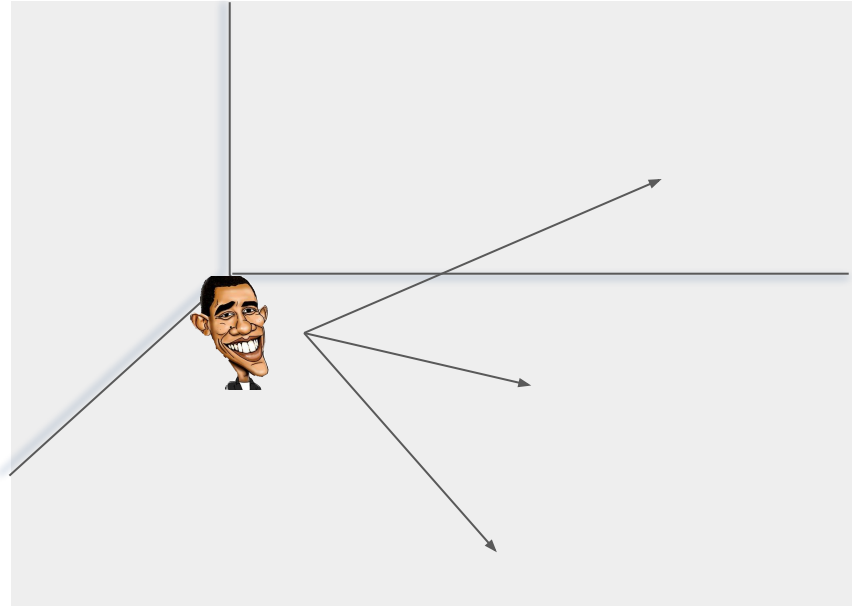
electron



muon
x 200 !!

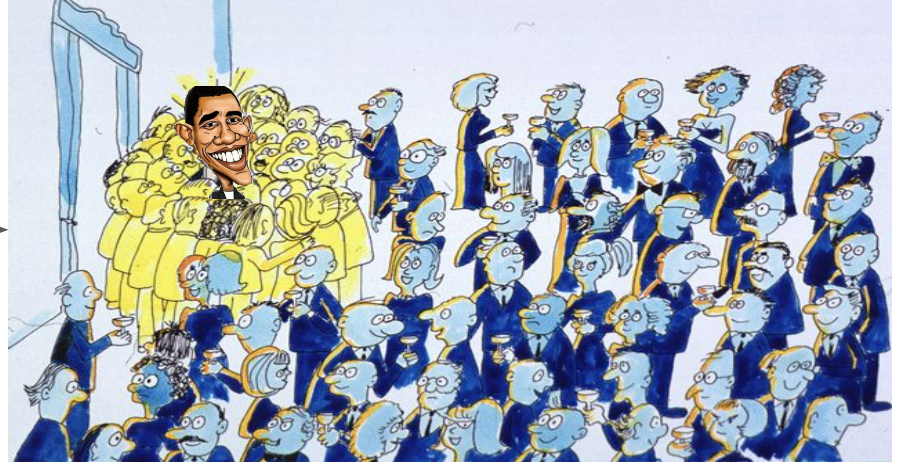


Higgs Mechanism, last SM particle to be discovered



vacuum = empty room?

Higgs Mechanism, last SM particle to be discovered

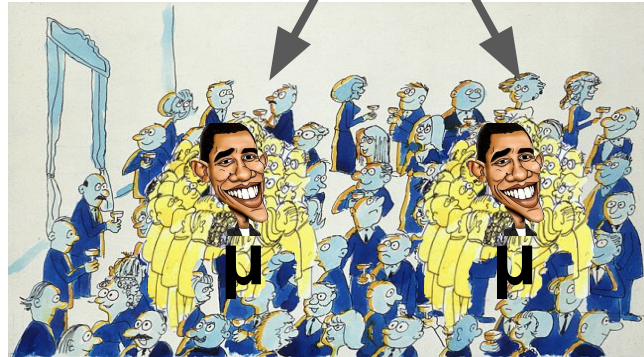
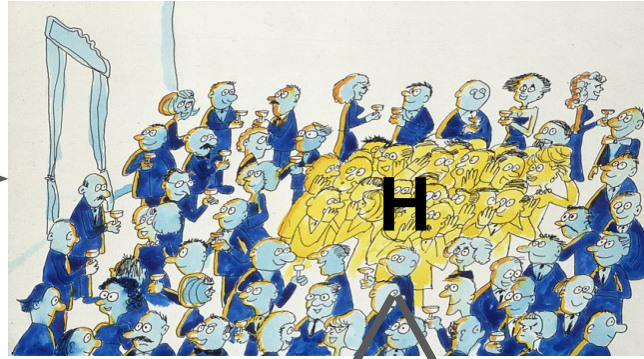


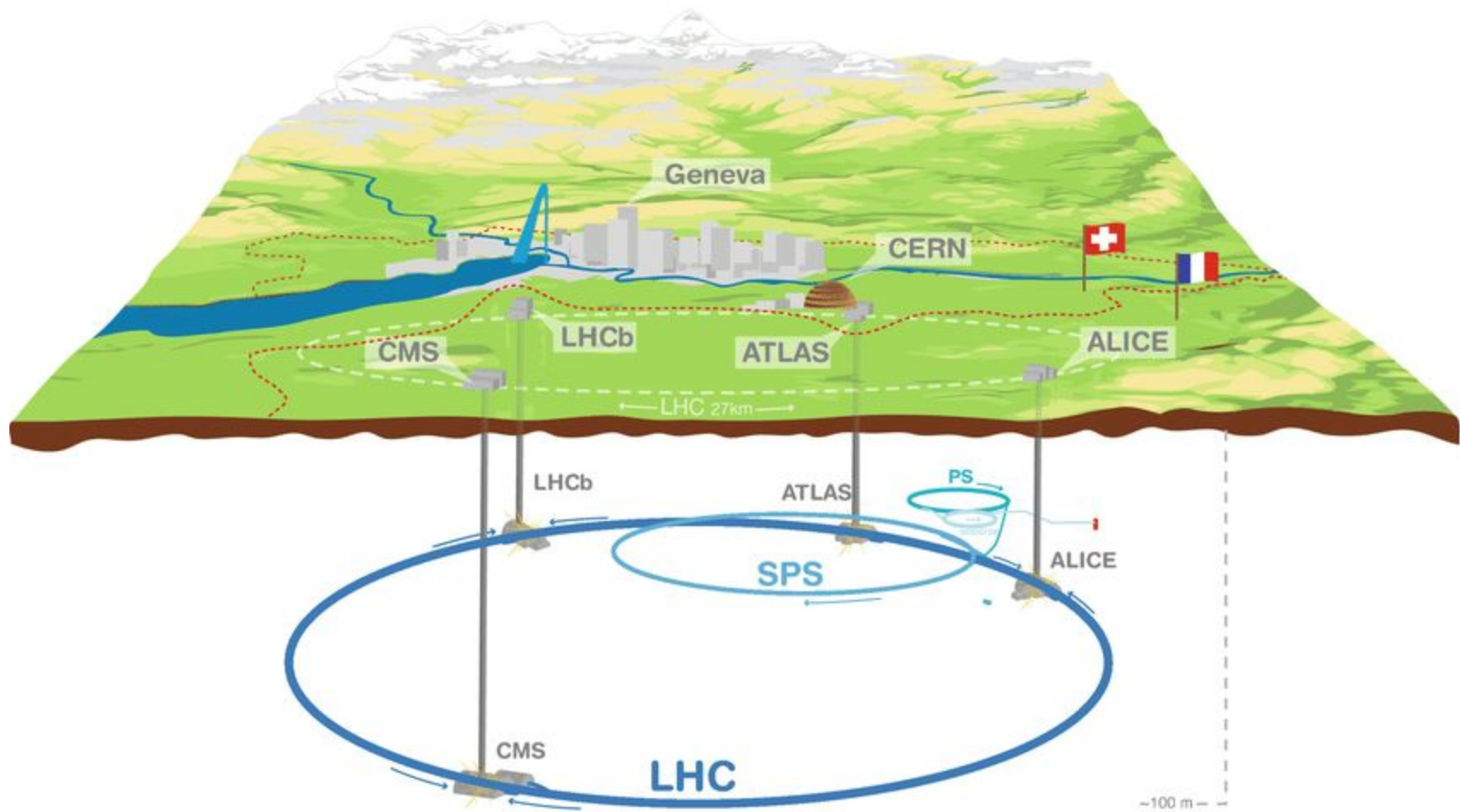
~~vacuum = empty room?~~

vacuum = room full of people
Higgs field

“crowding” = mass:
more popular more massive

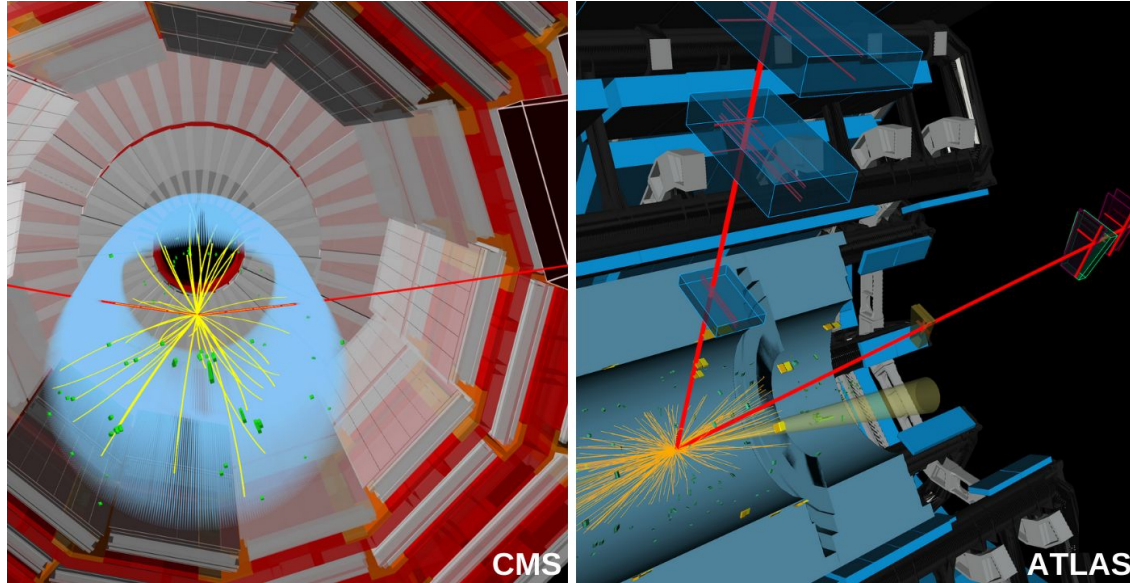
Higgs Mechanism, last SM particle to be discovered





H->mumu

Lorenzo



Candidate event displays of a Higgs boson in the two main detectors, <https://cds.cern.ch/record/2725767>