Some things have mass (like you) and some don't (like light).
Why is that? Where does mass come from?

Also give credit where credit is due...

The Higgs story or finding the last piece of the Standard Model puzzle.

Particle Discoveries (needed for the puzzle)
1974 (SLAC, BNL)
1977 (Fermilab)
1978 (DESY)
1983 (UA1, UA2)

TOP QUARK
BOTTOM QUARK
W BOSON
Z BOSON

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1964 3 papers are published by Englert & Brout, Higgs and Guralnik & Hagen & Kibble

to further tackle the mass question:
Particles gain mass by interacting with a new particle

Imagine Einstein walking into a room of physicists. Everybody will want to talk to him, making it harder for him to move - he has acquired mass

1966 “The Recipe Book”
Peter Higgs calculates how this new particle, now known as the Higgs boson, interacts with other particles

1967/8 “Bringing it all together”
Using this Higgs mechanism, Glashow, Weinberg & Salam combine the electromagnetic and weak force into what is known as the Standard Model

This mechanism could also give mass to fundamental particles like electrons & muons

How about a massive scalar (spin=0) particle?

1995 discovery
expected to interact the strongest with the Higgs as it is the heaviest

Future
Does this particle behave like Higgs predicted?
If not, is there New Physics?
Supersymmetry? Extra dimensions?

2000-2011 LEP & Tevatron results
How much does the Higgs weigh?

2012 Discovery of (something) Higgs (-like) at the LHC with mass ~ 126 GeV and more than 99.999% certainty

A giant leap for science

Web

1) greatly inspired by hep-ex.org/1201.6045

69th Scottish Universities Summer School in Physics, St Andrews, August 2012

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