



VECTOR-LIKE LEPTONS

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MAIN TYPES OF PARTICLES

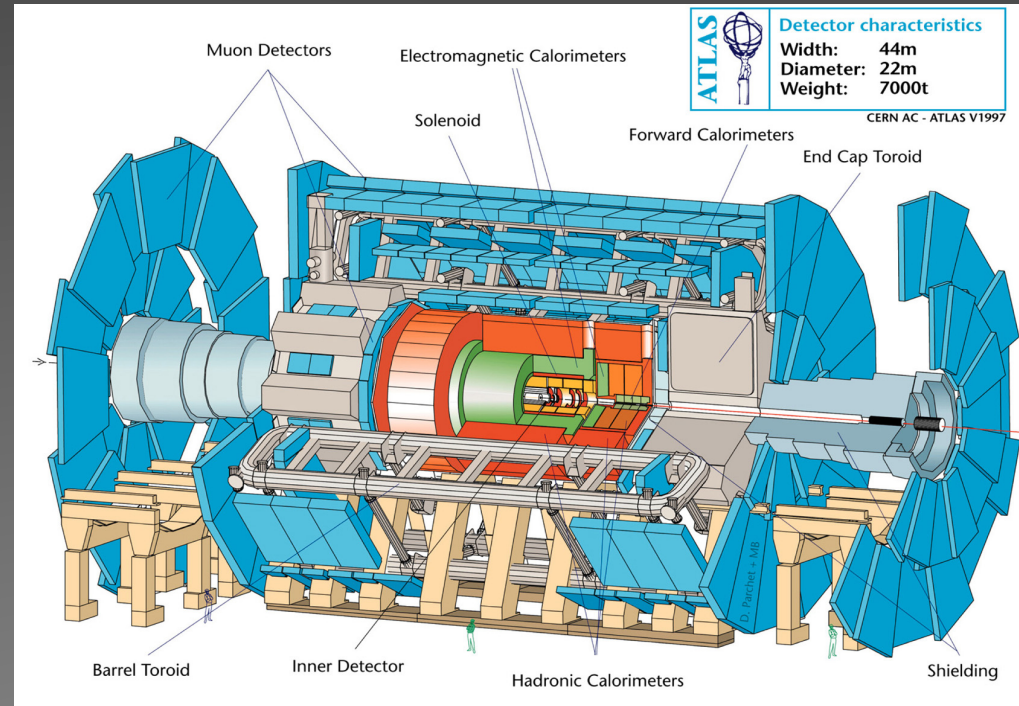
► Leptons

- Electrons
- Muons
 - Only live for around 2 millionths of a second
- Taus
 - Travels less than a millimeter before decaying
- All charged and have increasing mass – heavier particles don't last very long!

1968: SLAC <i>u</i> up quark	1974: Brookhaven & SLAC <i>c</i> charm quark	1995: Fermilab <i>t</i> top quark	1979: DESY <i>g</i> gluon
1968: SLAC <i>d</i> down quark	1947: Manchester University <i>s</i> strange quark	1977: Fermilab <i>b</i> bottom quark	1923: Washington University* <i>γ</i> photon
1968: Savannah River Plant <i>ν_e</i> electron neutrino	1962: Brookhaven <i>ν_μ</i> muon neutrino	2000: Fermilab <i>ν_τ</i> tau neutrino	1983: CERN <i>W</i> W boson
1937: Cavendish Laboratory <i>e</i> electron	1937: Caltech and Harvard <i>μ</i> muon	1976: SLAC <i>τ</i> tau	1983: CERN <i>Z</i> Z boson

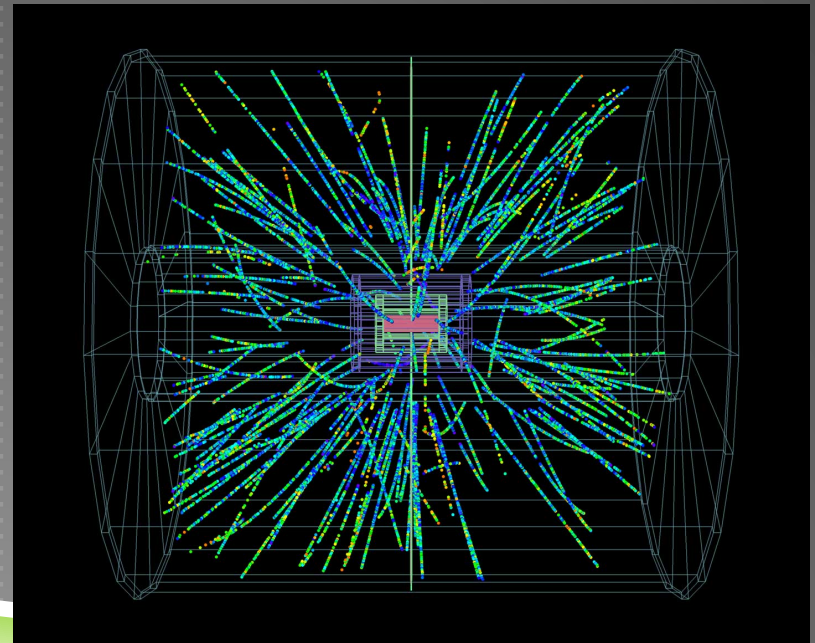
The Large Hadron Collider

- Largest collider in the world with the highest energy
- Built on Franco-Swiss border
- Several layers of equipment that takes measurements that are sent to a network of computers
- Around 40 million collisions occur every second, 1000 of which the detector records
 - More than 10^{10} events collected per year



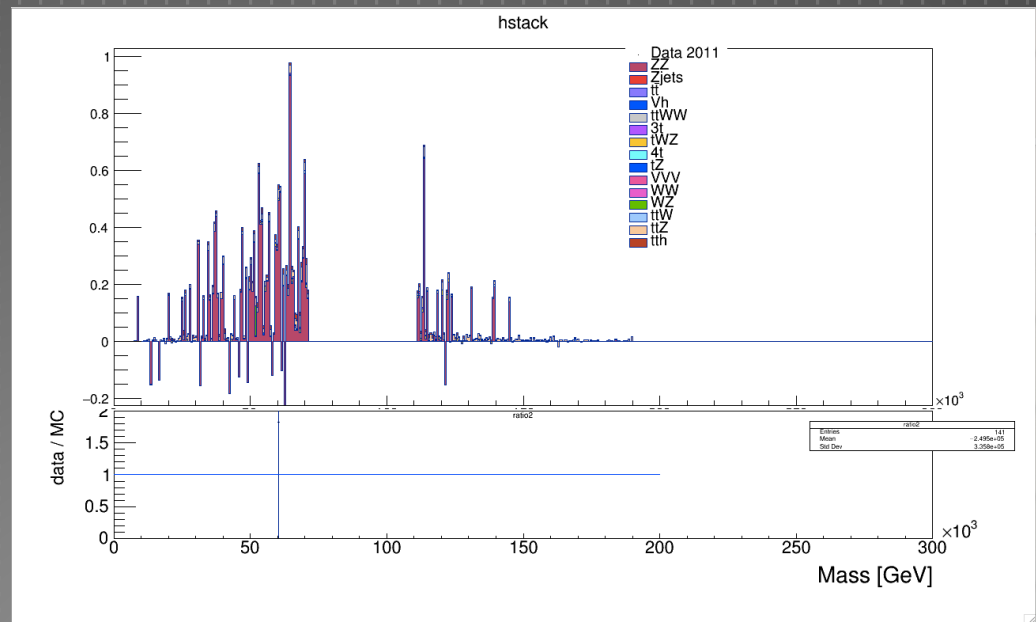
GOALS OF THIS PROJECT:

- ▶ Find the expected number of vector-like leptons correlating to each set of parameters
- ▶ Decipher if the data suggests evidence of the particles beyond the standard model through exotic signatures
 - ▶ For instance, a group of 4 electrons



MY PERSONAL CONTRIBUTION

- To design code that can optimize selection criteria for the clearest, most significant result



QUESTIONS?

