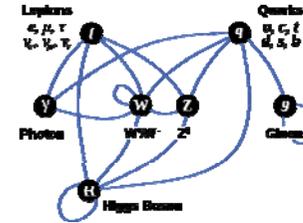


Outline

- Relativistic Kinematics
 - ▶ (4-momentum)² invariance, invariant mass
 - ▶ Hypothesis testing, production thresholds
 - ▶ Cross-sections, flux and luminosity
 - ▶ Particle lifetime, decay length, width
- Classification of particles
 - ▶ Fermions and bosons
 - ▶ Leptons, hadrons, quarks
 - ▶ Mesons, baryons
- Quark Model
 - ▶ Meson and baryon multiplets
 - ▶ Isospin, strangeness, c, b, t quarks
- Particle Interactions
 - ▶ Virtual particles and range of forces
 - ▶ Strong and weak decays, conservation rules
 - ▶ Parity, charge conjugation, CP
 - ▶ Weak decays of quarks
 - ▶ Colour charge, QCD, gluons
 - ▶ Charmonium and upsilon systems
- Electroweak Interactions
 - ▶ Charged and neutral currents
 - ▶ W, Z, LEP experiments
 - ▶ Higgs and the future
- LHC Experiments
- Future - introduction to accelerator physics

Note: no lecture on Monday 30 Jan.
To be re-arranged later in term as required.

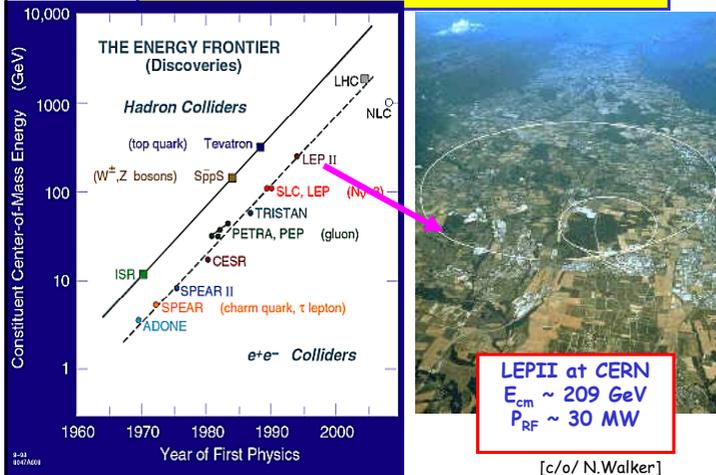
Health warning



- Comments in Allday's book about leptons being subject to the other three forces (not strong)
- Only charged leptons subject to e.m., γ couples to charge
- Similarly for Wikipedia

http://en.wikipedia.org/wiki/Standard_Model

"Energy Frontier" Accelerators



Bubble chambers



- Liquid (e.g. H_2) at high pressure, \sim several atm.
- Pressure reduced as beam arrives (superheated)
- Ionisation along charged particles' trajectories causes boiling
- Bubbles form for \sim ms
- Flash photographs, multiple angles, 3d-reconstruction
- Increase pressure and repeat
- Slow to accumulate data
- Iconic, full angular coverage for detection

