



Outline – I, The Standard Model



- **Tools**
 - Comphep
 - Calchep
- **SM Particles and Forces**
- **V-V Interactions**
- **SM Questions**
- **The LHC**
 - ATLAS and CMS
 - First Data – Soft Interactions
 - Hard Scattering



Outline – II, Early LHC Data



- **Hi Pt Jets**
 - Calibration and SM recovery
 - Di-Jets
 - Quark Composites?
- Exotics – Long Lived particles, Black-Holes
- Photons and Diphotons –
- b Tags
- $\psi, \Upsilon, W, Z, Z \rightarrow \tau$ pairs : $W' ? Z' ?$
- V-V Pairs
- Top pairs, $Z' ?$



Outline – III, The Higgs Boson



- **W-W Scattering**
- **Vacuum Fields**
- **Higgs Mass**
 - **W vs. Top Mass**
 - **Direct Searches @ LEP**
 - **Upper Limits**
- **Higgs Couplings to Bosons and Fermions**
 - **Decays and Production**
- **Vector Boson Fusion**
- **Higgs Quantum Numbers**
- **Higgs Pairs?**



Outline – IV, GUTS, SUSY, Dark Matter, Dark Energy



- **Running Coupling Constants**
 - QED
 - Standard Model
 - Unification
- **SUSY**
 - Unification
 - Production
 - LHC Searches
 - SUSY Spectroscopy at the LHC
- **Dark Matter**
 - SUSY DM
 - Direct Searches
 - Annihilation
- **Dark Energy**