

Physics beyond the Standard Model

Part II: Extended Higgs sector and Supersymmetry

Content of the course (2010-2011)

DRAFT!!

1. Short reminder of the EW theory
2. Constrain the missing part of the Standard Model, namely the Brout-Englert-Higgs boson; via loop corrections on the particles propagator, the EW measurement are sensitive to the mass of the mass of the Brout-Englert-Higgs boson; this global EW fit of data results in an indirect measurement of this mass.
3. Short reminder of the main concepts of the Standard Model Higgs sector.
4. Theoretical constraints on the Higgs sector of the Standard Model; perturbative constraint, vacuum stability constraint, fine-tuning problem, etc.
5. Phenomenology of the Higgs boson: decays and production at hadron colliders, and designing selection strategies to search for the boson.
6. General 2-Higgs Doublet Models
7. The hierarchy problem as a motivation for supersymmetry
8. Introduction to the phenomenology of supersymmetry with emphasis on the Minimal Supersymmetric Standard Model (MSSM) and the phenomenology of its particle spectrum.
9. The extended Higgs sector in the MSSM.
10. Experimental constraints on supersymmetry and the phenomenology of the search strategies for supersymmetry effects.