

Hauptseminar
Hunting New Physics in the Higgs Sector

1 Der Standardmodell (SM) Higgssektor - Test des Higgsmechanismus

Literatur: L.H. Ryder, "Quantum Field Theory", Cambridge University Press;

M.E. Peskin and D.V. Schroeder, "An Introduction to Quantum Field Theory", Frontiers in Physics

A. Djouadi, The Anatomy of electro-weak symmetry breaking. I: The Higgs boson in the standard model., Phys. Rept. 457 (2008) 1

M. Gomez-Bock et al., "Concepts of electroweak symmetry breaking", arXiv: 0712.2419

M. Mühlleitner, VL-Skript: "TTP2"

2 Defizite des SM - Motivation für Physik jenseits des SM

Literatur: I.Aitchison "Supersymmetry in Particle Physics", Cambridge University Press

H.E. Haber, "The search for SUSY: Probing Physics beyond the Standard Model", Phys. Rep. 117 (1985) 75

H.P. Nilles, "SUSY, Supergravity and Particle Physics", Phys. Rep. 110 (1984) 1

Stephen P. Martin, "A SUSY Primer", hep-ph/9709356

M. Mühlleitner, VL-Skript: "Supersymmetrie an Collidern"

3 Singulett Erweiterungen des Higgssektors

Literatur: V. Barger, H.E. Logan, G. Shaughnessy, "Identifying extended Higgs models at the LHC", Phys. Rev. D79 (2009) 115018 [arXiv:0902.0170]; Section III.A

V. Barger et al., "Complex Singlet Extension of the Standard Model", Phys. Rev. D79 (2009) 015018 [arXiv:0811.0393]

LHC Higgs Cross Section Working Group, "Handbook of LHC Higgs Cross Sections: 3. Higgs Properties", arXiv:1307.1347, Section 13, in particular 13.3.1-13.3.5

For singlet Dark Matter: L. Feng, S. Profumo, L. Ubaldi, "Closing in on singlet dark matter: LUX, invisible Higgs decays and gamma-ray lines", JHEP 1503 (2015) 045 [arXiv:1412.1105]

Further information in: R. Costa et al., “Two-loop stability of a complex singlet extended Standard Model”, *Phys. ReV. D*92 (2015) 2 [arXiv:1411.4048]

and R. Coimbra et al., “ScannerS: Constraining the phase diagram of a complex scalar singlet at the LHC”, *Eur. Phys. J. C*73 (2013) 2428 [arXiv:1301.2599]

4 Das 2-Higgs-Dublett-Modell (2HDM) Motivation, Higgssektor, Flavourproblem

Literatur: J.F. Gunion, H. E. Haber, G. Kane, S. Dawson, “Higgs Hunters Guide”, *Frontiers in Physics*

J.F. Gunion and H.E. Haber, “Higgs Bosons in Supersymmetric Models (I)”, *Nucl. Phys. B*272 (1986) 1, Kapitel 2-4.3

S. Kanemura, Y. Okada, E. Senaha and C.-P. Yuan, *Phys. Rev. D* 70 (2004) 115002 [hep-ph/0408364]

G. C. Branco, P. M. Ferreira, L. Lavoura, M. N. Rebelo, M. Sher and J. P. Silva, *Phys. Rept.* 516 (2012) 1 [arXiv:1106.0034 [hep-ph]]

M. Mühlleitner, *VL-Skript: “Beyond the SM Physics”, WS14/15*

5 Einführung in Supersymmetrie und das MSSM

Literatur: Stephen P. Martin, “A SUSY Primer”, hep-ph/9709356
M. Drees, R.M. Godbole and P.Roy, “Theory and Phenomenology of Sparticles”, *World Scientific*, Kapitel 8-10

I.Aitchison, “Supersymmetry in Particle Physics”, *Cambridge University Press*

H. Kalka, G. Soff, “Supersymmetrie”, *Teubner Verlag* J.F. Gunion, H. E. Haber, G. Kane, S. Dawson, “Higgs Hunters Guide”, *Frontiers in Physics*

A. Djouadi, “The Anatomy of electro-weak symmetry breaking. II. The Higgs bosons in the minimal supersymmetric model”, *Phys. Rept.* 459 (2008) 1

M. Mühlleitner, *VL-Skript: “Supersymmetrie an Collidern”*

6 Der Higgssektor des MSSM, Gemeinsamkeiten/Unterschiede MSSM-2HDM

Literatur: Siehe Literatur 4 und 5

7 Composite Higgs

Literatur: Roberto Contino, "The Higgs as a Composite Nambu-Goldstone Boson", arXiv:1005.4269

J.R. Espinosa, C. Grojean and M. Mühlleitner, "Composite Higgs Search at the LHC", JHEP 10052010065, arXiv:1003.3251

M. Mühlleitner, VL-Skript: "Beyond the SM Physics", WS14/15