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Autore	Nagashima Yorikiyo
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Nota di contenuto	Beyond the Standard Model of Elementary Particle Physics; Contents; Preface; Acknowledgments; Glossary; Chapter 1 Higgs; 1.1 Introduction; 1.2 Higgs Interactions; 1.2.1 Standard Model; 1.2.2 Lagrangian After Symmetry Breaking; 1.2.3 Decay Modes; 1.3 Mass; 1.3.1 Predictions from EW Data; 1.3.2 Vacuum stability; 1.3.3 Theoretical Upper Limit; 1.4 Little and Big Hierarchy Problem; 1.5 Higgs in the Supersymmetry; 1.5.1 Two Higgs Doublets; 1.5.2 Coupling Strengths of MSSM Higgs; 1.5.3 Mass Spectrum of MSSM Higgs; 1.6 Is the Higgs Elementary?; 1.6.1 Technicolor Model; 1.6.2 Little Higgs Model 2.7 Solar Neutrino 2.7.1 The Solar Puzzle; 2.7.2 Matter Oscillation; 2.7.3 Reactor Experiment; 2.8 Three-Flavor Oscillation; 2.8.1 PMNS Matrix; 2.8.2 Summary of Experimental Data; 2.8.3 CP Violation and Mass Hierarchy; 2.8.4 Future Prospects; 2.9 Double Beta Decay; 2.9.1 The Effective Majorana Mass; 2.9.2 Current Status; 2.9.3 To Design an Experiment; 2.9.4 Experimental Apparatus; 2.10 Supernova Neutrino; 2.10.1 Stellar Evolution; 2.10.2 Feedback to Particle Physics; Chapter 3 Grand Unified Theories; 3.1 Introduction; 3.2 Why GUTs?; 3.2.1 Weinberg Angle in GUTs

3.2.2 Quantization of the Electric Charge; 3.2.3 Triangle Anomaly; 3.3 SU(5); 3.3.1 Fermion Representation; 3.3.2 Representation of the Gauge Particle; 3.3.3 Symmetry Breakdown; 3.3.4 Predictions; 3.4 SO(10); 3.4.1 Left-Right Symmetric World; 3.4.2 New Gauge Bosons  $Z'$  and  $W'$ ; 3.5 Hierarchy Problem; 3.6 SUSY GUT; Chapter 4 Supersymmetry I: Basics; 4.1 Introduction; 4.1.1 Toy Model; 4.1.2 Field Theoretical Operators; 4.2 Two-Component Formalism; 4.2.1 Majorana Fields; 4.2.2 SUSY Operators; 4.2.3 Superspace; 4.3 Chiral Superfield; 4.3.1 Products of Chiral Superfields; 4.4 Vector Superfields; 4.4.1 Field Strength; 4.5 Action; 4.5.1 SUSY Invariant Action; 4.5.2 Kinetic Energy of Chiral Superfield; 4.5.3 Superpotential; 4.5.4 Lagrangian of the Chiral Fields; 4.5.5 Kinetic Energy of Vector Field; 4.6 Gauge Interaction; 4.6.1 Global U(1) Transformation; 4.6.2 Local U(1) Transformation; 4.6.3 Non-Abelian Interaction; 4.7 Summary of SUSY Lagrangian; 4.8 Spontaneous Symmetry Breaking; 4.8.1 D-Term Breaking; 4.8.2 F-Term Breaking; Chapter 5 Supersymmetry II: Phenomenology; 5.1 Introduction; 5.2 Minimum Supersymmetric Standard Model; 5.2.1 Particle Spectrum; 5.2.2 Interactions; 5.2.3 Constraints

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Sommario/riassunto

A unique and comprehensive presentation on modern particle physics which stores the background knowledge on the big open questions beyond the standard model, as the existence of the Higgs-boson, or the nature of Dark Matter and Dark Energy.

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