

Science and Engineering



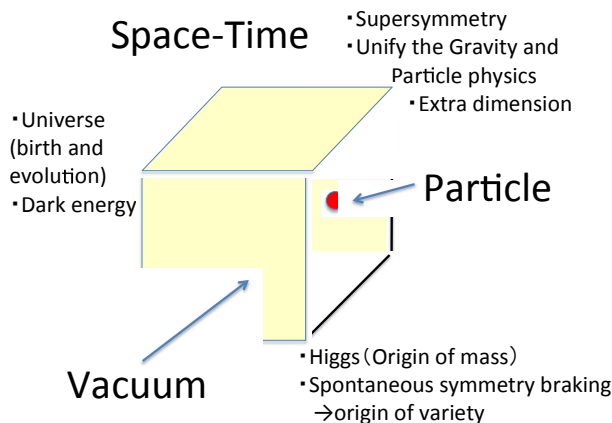
Title of Project : Particles Physics opening up the Tera-scale horizon using LHC

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【Purpose of the Research Project】

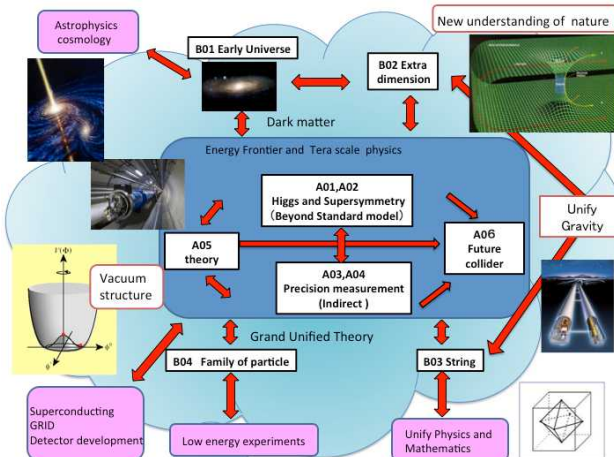
LHC (Large Hadron Collider) is the energy frontier collider operated at CERN, and it is the first time to research “Tera-scale physics” directly in the history of the human race. We will discover Higgs boson and Supersymmetric particles (or another phenomena beyond the Standard Model) using the LHC. Based on these experimental results, we explore researches of the structure of vacuum, the origin of mass, the relation of particle and space-time. These researches make paradigm-shift including “particle”, “vacuum” and “space-time”.



【Content of the Research Project】

Structures of this Project are as follows:

(1) 6 groups including one theoretical group



focus on the research using the ATLAS detector at LHC. Purposes of these groups are to

discover the Higgs boson, the Supersymmetric particles and new phenomena beyond the Standard Model. New technologies of the detector and accelerator are also developed for the future experiment.

(2) 4 groups expand the results obtained at Tera-scale to the various researches of the cosmology, early Universe, the vacuum structure, the origin of mass, structure of space-time, family of the fermion, the supergravity, and the super-string theory.

【Expected Research Achievements and Scientific Significance】

(1) Discovery of Higgs boson: Higgs boson is the proof that the symmetry of our vacuum is spontaneously broken, and it becomes origin of mass. The broken symmetries play important role of inflation, and the evolution of our Universe.

(2) Discovery of new Phenomena beyond the Standard Model (BSM): Supersymmetry(SUSY) is the most promising candidate of BSM. SUSY is the fundamental symmetry to exchange Boson and Fermion. The lightest Supersymmetric particle is a good candidate of the dark matter in the Universe. Furthermore SUSY is the necessary symmetry to unify the general relativity and the quantum theory.

(3) Development of the advanced technologies for the detector and accelerator. These will be used in The High Luminosity LHC project (Start from 2020) and also in the future experiments.

【Key Words】

Higgs boson, SUSY, LHC

【Term of Project】 FY2011-2015

【Budget Allocation】 1,083,800 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.icepp.s.u-tokyo.ac.jp/terascale/>