

Unity of nature -Nonlinear-supersymmetric general relativity theory-

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On (unstable) Riemann space-time just inspired by nonlinear representation of supersymmetry(NLSUSY), whose tangent space is specified by Grassmann degrees of freedom ψ of $SL(2,C)$ besides the ordinary Minkowski one x of $SO(1,3)$, we can perform the geometric argument of Einstein general relativity principle and obtain straightforwardly new Einstein-Hilbert-type action (nonlinear-supersymmetric general relativity theory(NLSUSYGR)) equipped with the cosmological term. Due to the NLSUSY nature of space-time NLSUSYGR would break down spontaneously to ordinary Riemann space-time(graviton) and Nambu-Goldstone(NG) fermion (primordial matter)

The gravitational interaction of NG fermion with NLSUSY invariance gives a new paradigm for the unification of space-time and matter.

We show by linearizing NLSUSY that the standard model(SM) of the low energy particle physics can emerge in the true vacuum of NLSUSYGR as the gravitational NG fermion composite eigenstates of super-Poincare space-time symmetry, which continues naturally to the standard Big Bang scenario of the universe.

NLSUSYGR paradigm can bridge naturally the cosmology and the low energy particle physics and provides new insights into unsolved problems of cosmology, SM and mysterious relations among them, e.g. the space-time dimension four, the dark energy and matter, the dark energy density ρ (neutrino mass)⁴, the tiny neutrino mass, the three-generations structure of quarks and leptons, etc..

[Ref.] K. Shima, Invited talk at Conference on Cosmology, Gravitational Waves and Particles, 6-10, January, 2017, NTU, Singapore.. Proceeding of CCGWP, ed. Harald Fritzsch, (World Scientific, Singapore, 2017), 301.

K. Shima Invited talk at 14th Rencontres du Vietnam on Windows on the Universe

25th Anniversary, 8/5-11, 2018, Quy Nhon, Vietnam. Proceedings of Windows on the Univers, ed. Jacques Dumarchez, et.al, at press.

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