Noncommutative algebraic geometry and physics

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June 16, 2016

INTRODUCTION

In this series of talks I shall sketch a mathematical model for a Big Bang scenario, based on relatively simple deformation theory in non commutative algebraic geometry, and show that it leads to my "Toy Model", treated in the book "Geometry of Time-Spaces, (WS) 2011". More interesting is that this Big Bang Model comes with a universal local "Gauge Group", i.e. a Lie algebra containing the Lie algebras of the gauge groups of the Standard Model, acting on all relevant representations of the theory.
Making precise the notion of quotient, in the non-commutative algebraic geometry of my tapping, the result seems to fit well with the set-up of the Standard Model, and fuses, to some degree, quantum theory and general relativity.
These subjects are all treated within the set-up of (WS), i.e. it is a purely mathematical model with, maybe, some interesting interpretations in physics.

CONTENT

- Mathematical models in physics, an Introduction
- Time and Dynamics
- Gauge Groups and Measurements
- Geometry of Representations
- Dynamics and the Dirac Derivation

- I Phase Spaces of Associative Algebras
- The Kodaira-Spencer class
- Hamiltonians and Connections
- Chern characters
- The iterated Phase Space functor as a co-simplicial resolution
- Relations to the de Rham complex
- Preparations and Time Evolution of Representations

- II The generic dynamical structure, $C(\sigma_g)$, of a polynomial k-algebra C, induced by a metric g
- The Dirac Derivation in $C(\sigma_g)$
- Force Laws in $C(\sigma_g)$, General Relativity
- Classical Connections

- III Quotients in Geometry
- Quotients in non-commutative algebraic geometry
- Gauge Groups and quotients in physics
- The classical case

- IV Local Gauge Groups and their Actions
- Lie-Cartan Pairs and Lie Algebroids
- The role of the Cartan subalgebra of a local Gauge Group, in physics

- VI-VII Deformations of Associative Algebras
- The case of U, a singular point with a 3-dimensional tangent space
- The Versal family, **U** of U, and the Toy Model, $\underline{\tilde{H}}$
- Metric and Time, a Big Bang Model, Kepler and Newton

- VIII The Universal Local Gauge Group $\mathfrak{g} := Der_{\tilde{H}}(\mathbf{U})$
- Spin and Isospin
- Local Gauge Groups and their Actions
- Photones and Quarks

- IX-X-XI Elementary Particles, Weyl, Pauli and Dirac spinors, Chirality
- The Generic Time-Action
- Maxwell, Bloch and Seiberg-Witten's Equations.
- The Generalized Dirac Equation

- XII The Standard Model

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