

Physics notebook volume 18: 4/23/10 -7/29/10

Summary and context

I was still working on some fine points of the Wong equations for gravity during this whole notebook but also exploring lots of different issues in gauge gravity generally, including lattice gravity, gauge transformations, generalized gauge structures as laid out by the Chinese authors, the question of observables in quantum gravity, and noncommutativity. This is the notebook in which I made the discovery that noncommutativity and non-locality are inherent in gauge gravity. I also studied the Seiberg-Witten image of local translations and supersymmetry in the Wong equations. The work was discussed with Sergio.

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1. On April 23-26, I did calculations on the Wong equations.
2. On page 5, some notes on the Hamiltonian and action principle for a particle in a background gauge gravity field
3. On page 6, it is necessary to have

$$[x^\mu, p^\nu] = -i\hbar g^{\mu\nu} \quad (1.1)$$

On page 6, I also realized that the bracket of two velocities is not the field strength but rather is an $w^{\mu\nu}$.

4. On page 7 and 8, more computations on the Wong equations
5. On page 8, the Bianchi identity is calculated.
6. Page 9 was an effort to put gauge gravity in the framework of the Chinese authors.
7. Some observations
 1. May be tempted to conclude that gravitation is the theory for which the displacement algebra and the gauge algebra are isomorphic
 2. Classically, the refinement of composite fiber bundles seems necessary. It is unclear how this refinement changes the Chinese triple structure for noncommutative gauge theory.
 3. As the gauge algebra

Bibliography