

Title: Debate on SD models inequivalent to GR

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URL: <http://pirsa.org/15060034>

Abstract:

## What is the most general gravitational intersection theory?

Fine-print:

- Has to be first class wrt diffeomorphisms.
- Contain two propagating degrees of freedom.
- Up to second order in momenta.
- Optional: regular single connected component.

Answer:

$$aR + \frac{\sigma^{ab}\sigma_{ab}}{\sqrt{g}} + \left(\frac{3}{8}\tau^2 + c\tau + 2\Lambda\right) = 0$$

(could have e.g.  $\tau_i$  for different components)

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## Weakening the requirements

What if the Hamiltonian constraint closes only at the intersection surface?

No duality. Do we have such an example? Yes:

$$\bullet aR\sqrt{g} + \frac{\pi^{ab}\pi_{ab} + bm^2}{\sqrt{g}} + (f(V)\pi + 2\Lambda\sqrt{g}) = 0$$

Closes only on  $\pi/\sqrt{g} = \text{cte}$ .

Canonical transformation with  $b = -1/2$  goes to ADM Hamiltonian with:

$$\Lambda \rightarrow \Lambda + 3f^2(V)$$

Case with  $b \neq -1/2$  not yet studied (Horava).

## Are there signatures?

Neutrinos and Ashtekar connection:

Got a volume-dependent cosmological constant. But also relation between extrinsic curvature and momenta disrupted:

$$\pi_{ab} = K_{ab} - K g_{ab} - \frac{1}{2} g_{ab} f(V)$$

Ashtekar connection in chiral spinor dynamics differs from self-dual connection by torsion:

$$A_a^i = \omega_a^i - \frac{i}{2} e_a^i f(V)$$

(this is all for  $b = 0$ )

## Many open questions

- More signatures?
- What about for a variable DeWitt parameter?
- Variable speed of light?
- Canonical transformations?
- RG flow acting on cosmological constant and DeWitt parameter? (Horava)  
or better: RG flow on space of "local gauge-fixings" of conformal symmetry, which leave 2 physical dofs?  
More room than purely conformal diffeo invariants.