

ON THE CONSISTENCY OF QUANTUM SUPERGRAVITY

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We discuss the quantization of arbitrary supergravity theories on general curved Bosonic backgrounds. In this context, two potential obstacles have to be overcome:

1) as supergravity is a gauge theory, the equations of motions are not hyperbolic a priori, i.e. a causal propagation of the degrees of freedom is not manifest.

2) due to the Fermionic nature of the gauge fields in supergravity a non-trivial "unitarity problem" appears which has to be overcome in order to obtain a quantum theory on a Hilbert space.

We address both issues by introducing a novel "causal" gauge fixing and by proving that the unitarity problem can be solved; our resulting formulation of the quantum theory is manifestly gauge-invariant. We discuss only the lowest order in perturbation theory, as the above-mentioned obstacles appear already at this level.