Title: Model Problems of the Theory of Gravitation

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Abstract:
Equations of motion for general gravitational connection and orthonormal coframe from the Einstein-Hilbert type action of the Einstein-Cartan theory are derived. Additional gauge freedom is geometrically interpreted. Our formulation does not fix coframe to be tangential to spatial section hence Lorentz group is still present as part of gauge freedom. 3+1 decomposition introduces tangent Minkowski structures hence Hamilton-Dirac approach to dynamics works with Lorentz connection over spatial section. The second class constraints are analyzed and Dirac bracket is defined.Reduction of phase space is performed and canonical coordinates are introduced. The second part of this thesis is dedicated to quantum formulation of Einstein-Cartan theory. Point version of Einstein-Cartan phase space is introduced. Basic variables, crucial for quantization, are derived via groups acting on the phase space and their selfadjoint representation is found. Representation of basic variables of Einstein-Cartan theory is derived via infinite tensor product of Hilbert spaces.

Keywords: Einstein-Cartan theory, Hamiltonian formulation, Quantum Gravity