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ABSTRACTS

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Noncommutativity of Constraining and Quantizing in Einstein's Gravity

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The inequivalence between the quatization of a reduced theory (QRT) and the Dirac reduction of the quatized theory (RQT) is discussed for the Einstein Gravity. The cause of such noncommutativity lies not only in the operator ambiguity [?], but also in i) zero modes of the first class constraints [?], ii) surface terms [?], and iii) gauge inequivalence of the QRT and RQT schemes for a class of physical problems with asymptotical unfree states and unflat space formed by the residue interaction (selected in the process of the classical reduction) [?]. In particular, the Wheeler-DeWitt equation cosmology in the RQT scheme completely differs from the QRT cosmology. The latter satisfies the correspondence principle and contains the Friedmann evolution of the pure classical (dust) Universe in the zero-mode sector of the momentum density constraint [?]. The quantum evolution of the Universe with any radiation differs from the Friedmann one, satisfies the causality principle for all types of the homogeneous space (close, open, flat) and recovers new possibilities for the explanation of the open problems such as hidden mass, large-scale structure and others [?].

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The super–integrable systems of the Smorodinsky — Winternitz type on the three dimensional sphere

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Some super–integrable potentials of the oscillator type are considered on the three–dimensional sphere. The coordinate systems on the sphere are listed in which the Schrödinger equation admits separation of the variables. For some simple cases the interbasis expansions are constructed.