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Is the Wheeler – DeWitt equation more fundamental than the Schrödinger equation?

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The Wheeler – DeWitt equation was proposed 50 years ago and until now it is a cornerstone of most approaches to quantization of gravity. One can find in the literature the opinion that the Wheeler – DeWitt equation is even more fundamental than the basic equation of quantum theory, the Schrödinger equation [1]. We still should remember that we are in the situation when no observational data can confirm or reject a fundamental status of the Wheeler – DeWitt equation, so we can give just indirect arguments in favor of or against it, grounded on mathematical consistency and physical relevance. I shall present the analysis of the situation and comparison of the standard Wheeler – DeWitt approach with the extended phase space approach to quantization of gravity [2]. In my analysis I suppose, firstly, that the future quantum theory of gravity must be applicable to all phenomena from the early Universe to quantum effects in strong gravitational fields, in the latter case the state of the observer (a choice of a reference frame) may appear to be significant. Secondly, I suppose that the equation for the wave function of the Universe must not be postulated but derived by means of a mathematically consistent procedure, which exists in path integral quantization. Thirdly, when applying this procedure to any gravitating system, one should take into account features of gravity, namely, non-trivial spacetime topology and possible absence of asymptotic states. The Schrödinger equation has been derived early for cosmological models with a finite number of degrees of freedom [3], and just recently it has been found for a spherically symmetric model which is a simplest model with an infinite number of degrees of freedom. The structure of the Schrödinger equation and its general solution appears to be very similar in these cases. The obtained results give grounds to say that the Schrödinger equation retains its fundamental meaning in constructing quantum theory of gravity.

[1] C. Rovelli, *Class. Quantum Grav.* **32** (2015) 124005.

[2] V. A. Savchenko, T. P. Shestakova, G. M. Vereshkov, *Gravitation & Cosmology* **7** (2001), P. 18-28; *ibid.* P. 102 – 116.

[3] V. A. Savchenko, T. P. Shestakova, G. M. Vereshkov, *Int. J. Mod. Phys.* **A14** (1999), P. 4473 – 4490; V. A. Savchenko, T. P. Shestakova, G. M. Vereshkov, *Int. J. Mod. Phys.* **A15** (2000), P. 3207 – 3220.

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