Contribution ID : **494**   Type : **Plenary/section talk**

On the meaning of the wave function of the Universe

Tuesday, 23 October 2018 17:25 (20)

The meaning of the wave function of the Universe was actively discussed in 1980s. In most works on quantum cosmology it is accepted that the wave function defines the probability amplitude for the Universe to have some space geometry, or to be found in some point of the Wheeler superspace. It seems that the wave function gives maximally objective description compatible with quantum theory. However, the probability distribution does not depend on time and does not take into account the existing of our macroscopic evolving Universe. What we wish to know is how quantum processes in the Early Universe determined the state of the present Universe in which we are able to observe macroscopic consequences of these quantum processes. The picture that can be obtained in the Wheeler – DeWitt quantum geometrodynamics is compared with that that of the extended phase space approach to quantization of gravity. We shall discuss how the wave function can be chosen among all possible solutions of the Wheeler – DeWitt (or Schrödinger) equation, if it does not depend on a reference frame, and what stage of the Universe evolution it describes.

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Session Classification : Gravitation and Cosmology