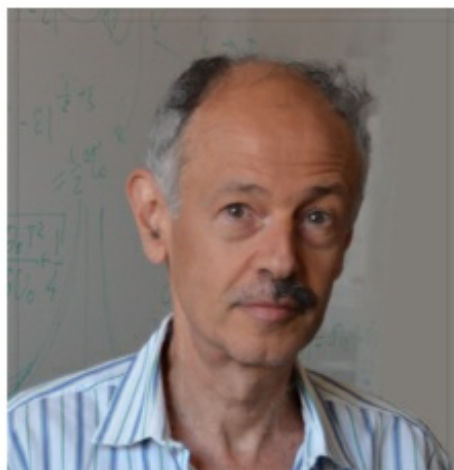


The A.A. Friedmann Prize for 2017

✍ G. Venturi 📅 31-07-2017 ↗ <http://www.primapagina.sif.it/article/638>

In July of this year the Presidium of the Russian Academy of Sciences awarded the A.A. Friedmann Prize for 2017 to Andrei Olegovich Barvinsky (Lebedev Physical Institute, Russian Academy of Sciences, Moscow), Alexander Yurievich Kamenshchik (University of Bologna and INFN) and Igor Ivanovich Tkachev (Institute for Nuclear Research, Russian Academy of Sciences, Moscow) for the cycle of works “New directions in cosmology of the early and modern Universe”. These are devoted to three main directions in cosmology:

- Quantum cosmology of the early inflationary stage of the evolution of the Universe;
- Field theoretical models of the dark energy responsible for the present accelerated expansion of the Universe;
- Investigation of the physical processes for the creation of particles and the reheating of matter during the inflationary stage and in the process of transition from the inflationary stage to the hot Big Bang stage.



Alexander Yurievich Kamenshchik

Quantum cosmology represents a part of theoretical physics, wherein the Universe is studied as a unique quantum object. In the papers by Barvinsky and Kamenshchik, using modern methods of quantum field theory, a connection between observational cosmology, quantum field theory and particle physics was found. The investigation of the wave function of the Universe, on taking into account one-loop quantum corrections, has led to the construction of a general algorithm for the calculation of probabilities for the initial parameters of the inflationary stage of the Universe.

Further, in contrast with practically all other works on quantum cosmology where the quantum state of the universe was considered as a pure one, a new research direction based on mixed quantum states, i.e. on the cosmological density matrices, was also found.

The discovery of the cosmic acceleration of the modern Universe in 1998, which in 2011 led to the Nobel Prize for its discoverers, raised the question of the possible causes for this acceleration. One of the possible sources could be the so called dark energy, having a negative pressure. In the paper by Kamenshchik, Moschella and Pasquier (2001) a first unified model of dark energy and dark matter, based on the Chaplygin gas was constructed. Another interesting class of dark energy models are models based on Born-Infeld-type fields (Gorini, Kamenshchik, Moschella, Pasquier, 2004). In papers dedicated to such models, a new class of cosmological singularities was discovered and the processes of their crossing were studied.

Alexander Kamenshchik (alias Alexandre Kamenchtchik) was born in 1957 in Novosibirsk, Russia, and studied in Moscow at the M.V. Lomonosov University where he obtained a Ph.D. in Physical and Mathematical Sciences under the supervision of Professor Dmitri V. Shirkov, member of the Russian Academy of Sciences. Then in 2000 he obtained the Degree of Doctor of Physical and Mathematical Sciences (Habilitation) at the L.D. Landau Institute for Theoretical Physics of the Russian Academy of Sciences.

He was employed by the L.D. Landau Institute for Theoretical Physics of the Russian Academy of Sciences until March of 2005, when he first became a researcher in the Department of Physics, University of Bologna and then a full professor in the Department of Physics and Astronomy, again at the University of Bologna, from September 2014.