

In memory of Konstantin Gennad'evich Selivanov

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One of the most brilliant young Russian theoretical physicists, Konstantin Gennad'evich Selivanov, passed away on April 7, 2004 at the age of 43 after a serious illness.

Selivanov was born in Perm' on December 23, 1960. His father was a leading engineer in the aviation industry, and his mother was a doctor. In 1973, the family moved to Moscow where Konstantin finished school and then enrolled in the Moscow Engineering Physics Institute (MEPhI).

He first came to the Institute of Theoretical and Experimental Physics (ITEP) in 1982, while still a student at MEPhI; having graduated from the postgraduate course, he joined the permanent staff of ITEP. Igor Yur'evich Kobzarev, his academic advisor, immediately recognized his original approach to complicated physics problems and his very impressive personality.

Selivanov was already able to produce important results in his very first publications: he calculated the decay probability of false vacuum in the two-dimensional scalar theory with pre-exponential accuracy, and the decay probability at nonzero temperature. He also described the behavior of false vacuum in the vicinity of an incipient instability.

A series of papers (co-authored with M B Voloshin) studied the processes of induced decay of false vacuum where the significant factors were the masses of heavy particles or the energies of colliding particles. It was shown that induced tunneling processes cannot be described by perturbation theory against the background of an Euclidean solution defining spontaneous tunneling. The possibility of cancelling the exponential suppression of tunneling probability on the sphaleron energy scale was also analyzed.

This pioneering work on the theory of induced non-perturbative processes has in fact opened a new field of research. It is now widely known in connection with the problem of the baryon charge nonconservation in high-energy collisions of particles.

In a number of papers Selivanov studied nonperturbative tunneling processes in the string and brane theory. He found string analogs of induced Schwinger pair creation processes and discovered new nonperturbative processes of particle decays in external fields. A novel cosmological model was proposed of 'brane world' creation by tunneling in an external field, which was free of nonphysical branes with negative tension. His work on nonperturbative phenomena in field theory and string theory brought him world fame.

In the 1980s, Selivanov (together with A A Roslyĭ) suggested an approach for describing tree diagrams in various field theories, based on introducing additional twistor variables; this allowed him to achieve a number of new results in the theory of gauge fields interacting with gravitational field. The twistor approach to describing



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(23.12.1960 – 07.04.2004)

amplitudes in the Yang–Mills theory has recently demonstrated its effectiveness and will undoubtedly find widespread applications in the years to come.

In the last several years of his life Selivanov spent much time working with students and leading the student colloquium. This work with young theorists gave him much satisfaction; many of his students are now active and successful research workers.

A brilliant physicist and mathematician, he was also a connoisseur of literature and arts, and a high-class chess player. He wrote several critical articles and essays published in literary magazines. His comments on science, art, and politics were always vivid and never a cliché. Talking to Konstantin Gennad'evich was invariably an intellectual delight.

His life was cut short at a young age and his potential was only partly realized. All who knew him grieve his passing. He will live in our memories.

*M B Voloshin, M I Vysotsky, A S Gorsky,
M V Danilov, B O Kerbikov, S G Klevtsov,
A Yu Morozov, V A Novikov, L B Okun,
A A Roslyĭ, V A Rubakov, A L Suvorov*