Monday, March 23, 2026
from 4:45 p.m. to 6:20 p.m. (Moscow time)
room 16-10 and ZOOM translation

Konstantin V. Shaitan

Mathematics and New Ideas in Modern Biology

When examining the molecular structure of living systems, one cannot help but feel a sense of wonder in the perfection of the structural organization of these elementary building blocks, which resemble coils of wire in a gel medium. Even more astonishing are the highly organized functional movements within these irregular gel structures. There are few ideas about how all this is physically arranged. There is a wealth of data, and the amount of data being collected on structures, dynamics, and kinetics is growing at a very rapid rate. The situation is such that we chase data, but thirst for knowledge. And knowledge requires new ideas.

The report discusses fundamental issues of the topography of the ultra-high-dimensional energy surface of biopolymers (based on Morse theory and the symmetry of biopolymers with respect to the permutation of identical monomer units) and the rules of motion along multidimensional energy surfaces in viscous media (using the mechanic equations in viscous media and the asymptotic properties of high-dimensional hyperspheres).

Based on these mathematical ideas, a physical model of the functional dynamics of biopolymers (proteins, DNA, RNA) is developed. Fundamental questions of molecular evolution and the conditions for the emergence of life on planets with different temperature regimes are addressed.

SCIENTIFIC SEMINAR
"DIFFERENTIAL GEOMETRY AND APPLICATIONS"

headed by Academician of RAS Anatoly T. Fomenko

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