Special Issue

Emergent Order Parameters in Complex Biophysical Systems

Message from the Guest Editors

In theoretical physics, the introduction of order parameters is well known to be subtle. The breaking of symmetry in a physical system is connected with some order parameter, though the definition of the latter is often vague. For instance, in the case of the isotropic–nematic transition, the order parameter is often chosen to be the average of the second Legendre polynomial. However, the nematic is more often than not so highly ordered that the orientational distribution is asymptotically Gaussian. When we do not understand the physical properties of a system (e.g., high temperature supercomductors), we do not know the correct order parameter(s). In the case of biophysical and biological systems, we are still in virgin territory with regard to the introduction of the appropriate order parameters. Theoretical physics has mechanics as its foundation. The generalized coordinates and momenta are the canonical variables of choice. In biology, the genescould be one set of variables imposing restrictions on coarse-grained parameters, but this connection is totally obscure at present.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

Editor-in-Chief

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