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**Physical Foundations of Self-organizing Systems** ATANU CHATTERJEE, Indian Institute of Technology Madras, Chennai 600036, India, GEORGI GEORGIEV, Department of Physics, Assumption College, Worcester, MA 01609, United States of America — The appearance of coherent global pattern due to local interactions is known as self-organization. Self-organization is a spontaneous process in highly non-equilibrium dissipative systems that form structures which tend to maximize energy dissipation by leveling off energy gradients. This follows as a direct consequence of the Second Law of Thermodynamics. Also, a local interaction embodies in the above definition a mechanistic dimension to self-organization. The link between mechanics and the Second Law of Thermodynamics lie in the Principle of Least Action, a strong law of nature that is obeyed in every spontaneous process. Thus, self-organization rests on two basic foundational principles of nature namely, the Second Law of Thermodynamics and the Principle of Least Action. We attempt to develop a formal definition of self-organization based on those principles.

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