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From order to disorder in ensembles: Back and forth localization and pattern formation in hierarchies

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We present a universal framework for generation, analysis and control of non-trivial states/patterns in the complex systems like kinetic hierarchies describing general set-up for non-equilibrium dynamics and their important reductions. We start from the proper underlying functional spaces and their internal hidden symmetries which generate all dynamical effects. The key ingredients are orbits of these symmetries, their representations, and local nonlinear harmonic analysis on these orbits. All these provide the possibility to consider the maximally localized fundamental generic modes, non-linear (in case of the non-abelian underlying symmetry) and non-Gaussian, which are not so smooth as Gaussians and as a consequence allowing to consider fractal-like images and possible scenarios for generation chaotic/stochastic dynamics on the level of representation theory. As a generic example we consider the modeling of fusion dynamics in plasma physics.

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