

Title: Patterns in nature and the laboratory

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Abstract: If you have ever looked at the tips of your fingers, at tiger coats, fish skins, or at the wonderful yellow-orange spirals at the center of a sunflower, you will know that nature conspires to produce almost periodic or quasiperiodic patterns. This RTG will discuss both about how and about why such features are produced. The how involves discussion and description of the mechanisms by which the uniform state of systems stressed far from equilibrium can become unstable and lead to patterned states. Examples are convection patterns seen in nature and in laboratories in which a horizontal layer of fluid is heated from below and on plants where instabilities of biochemical origin can give rise to all the wonderful structures, including spiral families enumerated by Fibonacci numbers, which we see on flowers and on pine cones. The why, the teleology (X is so in order that Y..., e.g. tigers have stripes in order to be better camouflaged) and its connection with the how is also worth thinking about. Could it be that organisms use macroscopically induced patterns to enable the pursuit of optimal strategies? We are not likely to cover these questions in any depth in a series of three or four lectures but I hope to give those who choose to attend some flavor of the exciting world of patterns and pattern formation.