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Topological Analysis of Spatial Temporal Patterns

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It is fairly easy to collect large amounts of high dimensional data describing the time dependent spatial structures of materials or fluids either through experimentation or numerical simulation. In this talk I will describe how techniques from computational topology can be used to reduce both the size and dimension of the data sets and still provide useful statistics for parameter identification, model selection, and quantification of the spacio-temporal complexity of the dynamics. These ideas will be presented in the context of experimental working involving spiral defect chaos for Rayleigh- Benard convection and numerical simulations of stochastic and deterministic Cahn-Hilliard equations.