

Benjamin Good

Mentors: Aaron Clauset, SFI Postdoctoral Fellow, Miguel Fuentes, SFI Postdoctoral Fellow, D. Eric Smith, SFI Professor

With Aaron Clauset, Ben will perform numerical computations on community structure in several real world networks to see if a grouping with a high modularity score reflects something unique about the network or whether many such groupings exist. If it happens to be the latter, our ability to use a computer to approximate the groups of a network and make inferences based on that grouping will be limited. To conduct this analysis, they will utilize Markov Chain Monte Carlo (MCMC) methods to sample a wide variety of possible groupings in order to see whether several different groupings with a high modularity score exist and if they do, find some way to quantify their differences.

Also, with Miguel Fuentes and Eric Smith, Juan Diego and Ben will explore the behavior of a nonlinear map poised at the edge of chaos. Once in the chaotic regime, these systems display a smooth distribution of visited positions and obey the central limit theorem. This leads to classic transport behavior that scales linearly with time, a behavior well known since Einstein's landmark paper on Brownian motion. Right at the edge of chaos, however, these systems have a strange fractal distribution and it is unknown whether they display any kind of transport behavior at all. Their work will be to explore this area and see if they can prove any results.