

Evolution of networks: robustness, complexity and adaptability

Initiative: Modellierung und Simulation komplexer Systeme (beendet)

Ausschreibung: Komplexe Netzwerke als fächerübergreifendes Phänomen

Bewilligung: 29.03.2007

Laufzeit: 3 Jahre

The goal of the project is to develop new concepts and analytic tools that allow for a refined understanding of the evolution of dynamical networks. In particular, an enhanced insight into the mechanisms that shape the structure of gene-regulatory networks is intended. To this end, evolutionary scenarios are analyzed under predefined constraints on network structure and dynamical behavior. Particular attention is given to the evolution of robustness, complexity and adaptability. For these fundamental systems characteristics rigorous quantitative definitions are derived in an information theoretic framework. In such a way the relationship between structure and function can be addressed in depth. The project employs methods ranging from computer simulations to rigorous mathematical analysis at various levels of abstraction, including evolutionary models of binding sites and interactions at DNA level.

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