Evolution of Networks: Modeling the complexity and robustness of evolving biochemical networks (Extension)

Initiative: Modellierung und Simulation komplexer Systeme (beendet)

Ausschreibung: Komplexe Netzwerke als fächerübergreifendes Phänomen

Bewilligung: 28.11.2010

Laufzeit: 3 Jahre

The project tackles concepts as well as numerical and analytic methods that allow for a refined understanding of the evolution of biochemical networks. The aim is a computer simulation for adaptive and neutral evolution of complex chemical reaction networks including the catalyzing enzymes and their regulation. The corresponding mathematical methods will be refined, in particular about hypergraphs, combinatorial vector fields, and network dynamics. These numerical as well as purely mathematical studies focus on two model systems: Metabolic networks which are more general than graphmodels, and Boolean networks as abstract models of regulatory networks conveying a non-trivial dynamics on their nodes. Drawing from the expected insights into evolution of networks, a further clarification of conceptual issues is envisaged, in particular robustness of function under evolving structure.

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