M A T H E M A T I C A L P H Y S I C S S E M I N A R

Rutgers University
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Central Problems in Biological Clocks: Identifying Structures of Biochemical Networks and Understanding Functions of Biochemical Networks

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Abstract

Biological rhythms control important aspects of cell physiology including circadian (daily) events, cell division, embryogenesis and DNA damage repair. While recent experimental work has identified many genes and proteins that are involved in biological clocks, identification of entire biochemical network seems far from complete since current experimental techniques require tremendous amount of work. On the other hand, output of the networks, timecourses of genes and proteins can be easily acquired with advances in technology. I will describe how to use these timecourse data to reveal biochemical network by using fixed point of iteration map. Moreover, the structures of biochemical networks are tightly related with their functions. I will present two different designs of biochemical network: one is optimized to maintain a constant period over a wide range of conditions and the other is optimized to tune their period depending on conditions.