



# 生物信息学研究中心

Center of Bioinformatics

# 学术报告

**题目：** Mathematical modeling of circadian rhythms

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**时间：** 5月30日（星期三）下午 3:30

**地点：** 思源楼 1013 室

**摘要：** Circadian oscillations occur spontaneously with a period of about 24 h in nearly all living organisms. These oscillations originate from intertwined feedback processes in genetic regulatory networks. Based on experimental observations, mathematical models of increasing complexity have been proposed for the molecular mechanism of circadian rhythms. Deterministic models were first proposed for circadian rhythms in *Drosophila*. These models account for the occurrence of sustained oscillations of the limit cycle type and for a variety of dynamical properties such as phase shifting or long-term suppression by light pulses and entrainment by light-dark cycles. Stochastic versions of the models are needed to examine how molecular noise affects the emergence and robustness of circadian oscillations. Extending the model to the case of the mammalian circadian clock allows us to address the dynamical bases of physiological disorders of the sleep-wake cycle in humans.

References :

Leloup, J.C. and Goldbeter, A. 2003. Toward a detailed computational model for the mammalian circadian clock. *Proc. Natl. Acad. Sci. USA* 100, 7051-7056.

Leloup, J.C. and Goldbeter, A. 2004. Modeling the mammalian circadian clock : Sensitivity analysis and multiplicity of oscillatory mechanisms. *J. Theor. Biol.* 230, 541-562.