



University of Stuttgart

Stuttgart Research Center Systems Biology (SRC SB)

„Allostery and genetic  
information integration“

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**Tuesday**  
**April 30, 2019**  
*4 p.m. – 5 p.m.*

Room 2.255  
Pfaffenwaldring 9

**Kolloq. Techn.  
Kybernetik  
&  
Systems Biology  
Seminar**

**Abstract:**

The way in which genes are regulated changes dramatically between bacterial cells and the eukaryotic cells out of which we are composed. In the latter context, small packets of genetic information, sometimes separated by millions of base pairs, are integrated together to determine whether and how a gene is expressed. How is this possible? In this talk I will revisit the concept of allostery – Jacques Monod's “second secret of life” – which shows that information can be integrated over long distances through conformational change. I will describe new results which show that sufficiently complex conformational ensembles can implement any form of information integration that is achievable at thermodynamic equilibrium and I will discuss the evidence for such conformational complexity in eukaryotic genomes.

**CV:**

I am a pure mathematician by training. I received my PhD in algebraic topology under Frank Adams at Trinity College, Cambridge. I was subsequently a Dickson Instructor at the University of Chicago and a Research Fellow at Trinity. I then spent several years in industrial research at Hewlett-Packard Research Labs, where I ran part of the company's “blue skies” research programme. I returned to academic life in the Department of Systems Biology at Harvard Medical School, where my laboratory studies cellular information processing using a combination of experimental, mathematical and computational methods. My abiding interest has been in using pure mathematical concepts to understand complex systems, for which biology provides the ultimate challenge.