

UNIVERSITY OF TEXAS AT DALLAS

**DEPARTMENT OF MOLECULAR AND CELL BIOLOGY**

**DEPARTMENT OF PHYSICS**

**COLLOQUIUM**

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Monday, January 30, 2006; Room FO 3.616

Reception: 3:30-4:00, Presentation: 4:00-5:00 PM

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**DNA translocation and looping mechanism of  
chromatin remodeling revealed by single-molecule  
studies**

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ATP-dependent chromatin remodeling complexes (remodelers) facilitate the binding of proteins to nucleosomal DNA, transfer histone octamers in *cis* or *trans*, assemble chromatin, or exchange histones. Despite their diverse functions, all remodelers share a highly conserved catalytic ATPase domain and are capable of altering nucleosomal DNA configuration, suggesting a conserved mechanism. Several models for chromatin remodeling have been proposed, but its molecular mechanism remains controversial. Here, we monitor the real-time activity of the SWI/SNF-family remodelers  $\gamma$ SWI/SNF and RSC, on single, stretched nucleosomal array templates. We show that these remodelers are ATP- and nucleosome-dependent DNA translocases. They are capable of moving at rates of  $\sim 14$  bp/sec and of generating forces up to  $\sim 12$  pN with processivities of  $\sim 100$  bp, producing intranucleosomal DNA loops of a broad range of sizes. A DNA loop so formed either dissipates suddenly or reduces its size continuously by what appears to be a reverse translocation. We propose a molecular mechanism for their activity.

Background information on optical tweezers, chromatin remodeling, and remodeler-catalyzed Brownian motion will be provided.

**About the speaker:** Dr. Yongli Zhang received his Ph.D. in Molecular Biophysics and Biochemistry from Yale University, MA in Theoretical Physics from the Institute of Theoretical Physics, Chinese Academy of Sciences, and BA in Applied Physics from Fudan University, Shanghai. He has been doing both experimental and theoretical work in DNA mechanics, chromatin dynamics, and mechanism of chromatin-associated molecular motors.