University of Texas at San Antonio

Department of Physics & Astronomy

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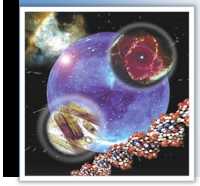
3:15p.m.-4:15p.m.

BB 3.04.18

Essentials of epigenetic switches from single molecule approaches

I will describe how single-molecule techniques based on simple physical principles can be used to understand the molecular mechanisms that regulate transcription of genes. I will also show how the bending and torsional elasticity of DNA play a role in such regulation. In particular, I will use the lambda and the 186 bacteriophages as model systems. The lambda repressor protein mediates a DNA loop which governs the epigenetic switch from lysogeny (quiescence) to lysis (virulence) after infection. Using magnetic tweezers, tethered particle and atomic force microscopy, we characterized how specific and non-specific binding of repressor protein to DNA as well as DNA negative supercoiling affect the lambda switch making it both robust and responsive. The same parameters are essential for the regulatory function of the disc-shaped 186 bacteriophage repressor which recapitulates most of the features of different transcriptional factors across kingdoms and we use as a representative TF in transcriptional assays.



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