NANOSCIENCE COLLOQUIUM

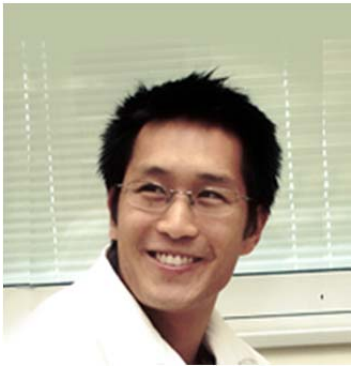
Thursday August 22th 2013 at 15:15, K-space, Fysicum

Biology from the bottom up:

Artificial synthesis of the bacterial flagellar motor

Dr. Lawrence Lee

Victor Chang Cardiac Research Institute, Australia



Nanoscale rotary motors are everywhere in nature. These biological machines perform functions as diverse and as fundamental as synthesising ATP, mediating vesicular transport and bone remodelling. The largest of these, the bacterial flagellar motor (BFM), is an ~11 mega Dalton protein superstructure consisting of hundreds of subunits that powers the rotation of long, helical flagellar filaments, which allows bacteria to swim through viscous media. Fuelled by an electrochemical gradient, it is equipped with an impressive molecular engine that converts a flux of cations into mechanical rotation at speeds of up to 1700Hz, yet also allows the motor to shift into reverse in a handful of milliseconds, tune its speed and stop either via a molecular brake or clutch. Understanding the molecular structure and function of the BFM promises enormous insight into dynamic macromolecular superstructures in general. For example, *how do hundreds of different proteins dance in unison to perform one function?* But a highly dynamic ~11 MDa transmembrane protein is no *'ordinary'* protein structure. It falls into a category where high-resolution structural biology cannot reach. Here I will describe our progress towards elucidating a complete atomic-scale molecular picture of the BFM structure and dynamics, which includes a new initiative to artificially synthesise the BFM using DNA nanotechnology.

Host: Heiner Linke (FTF)

This is one in a regular series of Nanoscience Colloquia, aimed at all researchers and students with an interest in nanoscience. The series is arranged by the Strategic Research Environment "The Nanometer Structure Consortium at Lund University" (nmC@LU) and by the Linnaeus environment "Nanoscience and Quantum Engineering", funded by the Swedish Research Council (VR).

Vetenskapsrådet