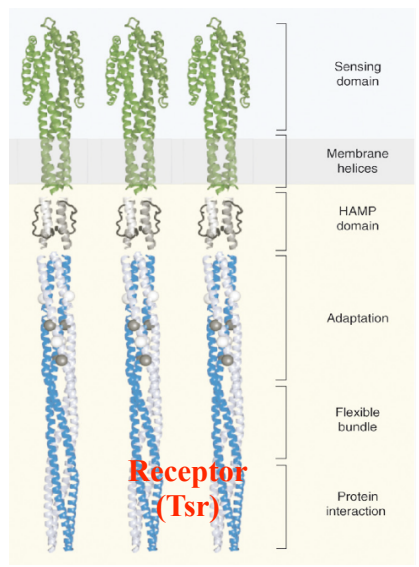
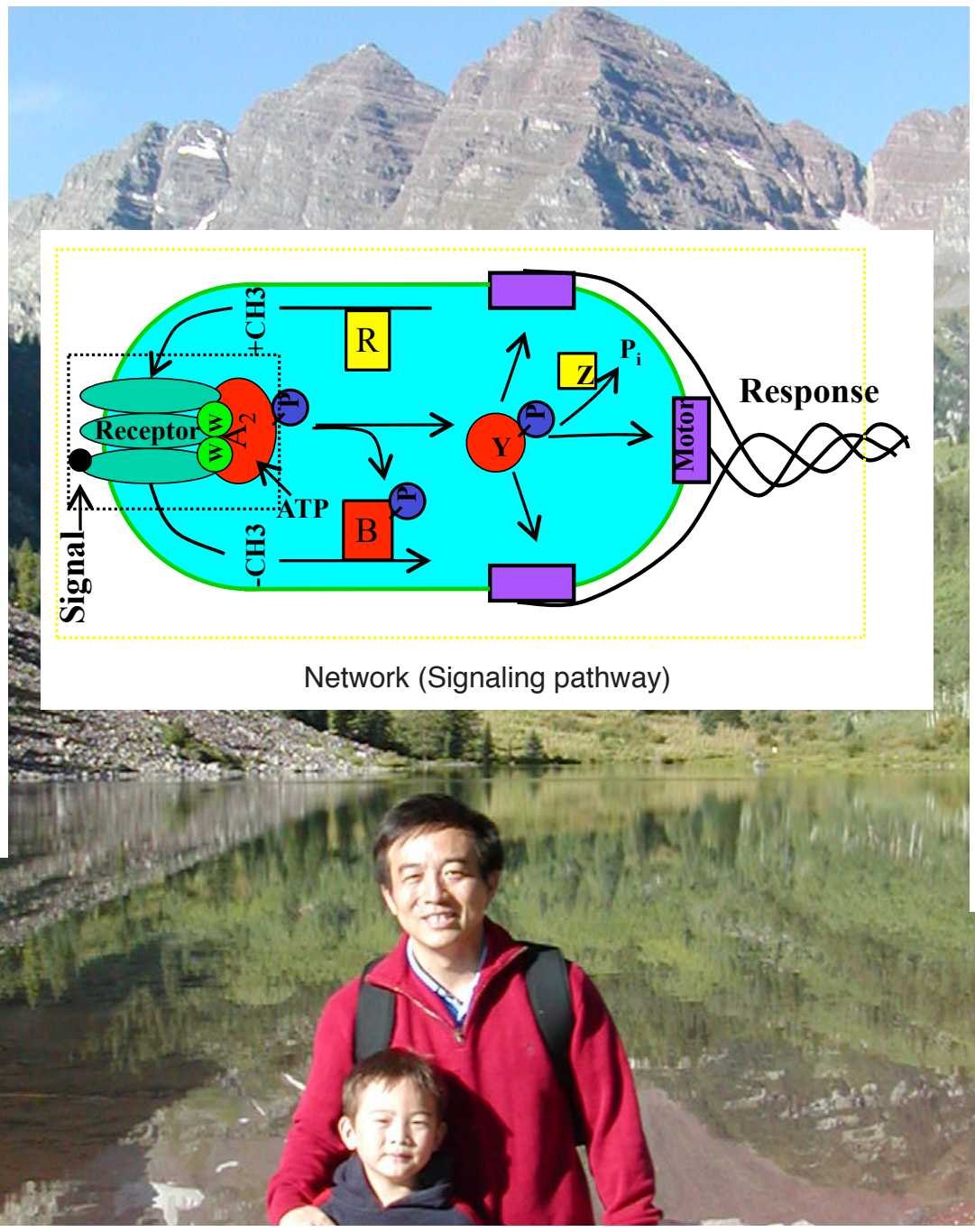
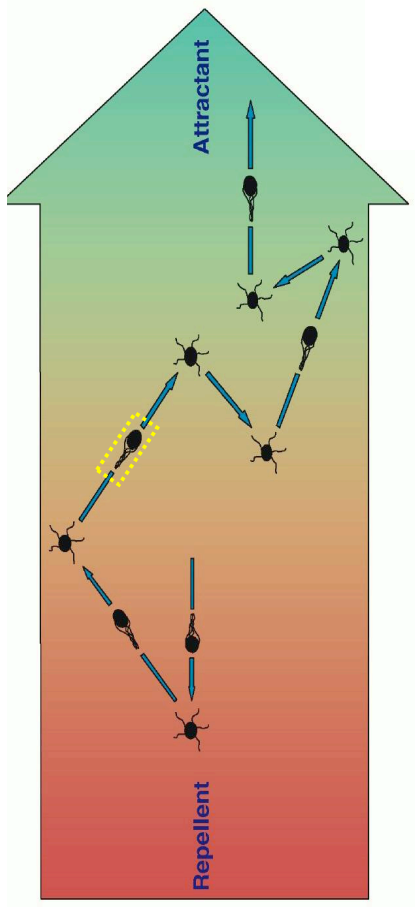
Boston University Physics Colloquium



Molecules (Proteins)



Network (Signaling pathway)



Behavior
(Bacterial chemotaxis)

From molecules to behavior:

E. coli's memory, computation and motility

Biological systems often exhibit fascinating, complex behaviors. Over the last half century, great progress has been made in identifying the key molecules (DNA, RNA, Proteins) responsible for various biological functions. One of the main challenge (and opportunity) in biology now is to understand the system-level behavior from the molecular level knowledge of the cell. We believe computational biology, in particular quantitative modeling similar to those commonly used in physics, can play a major role in meeting this challenge. As an example, I will present our recent work in trying to understand bacterial chemotaxis by using quantitative modeling approach. Based on molecular level knowledge of the E. coli chemotaxis pathway, we will address several interesting, important system-level questions: 1) Does E. coli have memory? How long does it take the cell to forget? 2) What kind of computation is the cell doing in response to stimulus? 3) How does the cell use its memory and computation capability to sense and respond to a minute chemical gradient (nutrient or toxin) among a wide range of background.

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April 2, 2009 (Thursday) at 3:30pm (Refreshments at 3:15pm)

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