



Physics Colloquium

Friday, November 26, 2010, 4:00 pm, PS 3046

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Modeling Campylobacter fetus cell surfaces: Physical insight into bacterial defense mechanisms

Campylobacter fetus is a species of Gram-negative bacteria widely recognized for its virulence in animals and humans. This bacterium possesses a paracrystalline array of high molecular weight proteins known as surface-layer proteins closely packed in a either a hexagonal or tetragonal lattice around its cell surface. It has been hypothesized that a function of these surface layer proteins is to aid C. fetus in the resistance to bactericidal agents.

A model has been made of the outer membrane of this bacterium together with its surface layer proteins and Monte Carlo computer simulation will be used to elucidate the stability of this structure as a function of ionic concentration. The effects of antimicrobial agents and their interactions with surface-layer proteins will also be analyzed. By contrasting these results with a surface-layer protein-deficient mutant, the resistance of protamine, a cationic antimicrobial peptide, by these proteins will be established.

This talk shall focus on the methodologies used to construct a model that is able to represent the behaviour of this complex biological system.