



*University  
of Toronto*

# Physics Colloquium

## Evolutionary "Design" of Proteins

**Rama Ranganathan**  
**University of Chicago**

Proteins can fold spontaneously into well-defined three-dimensional structures and can carry out complex biochemical reactions such as binding, catalysis, and long-range information transfer. The precision required for these properties is achieved while also preserving evolvability – the capacity to adapt in response to fluctuating selection pressures in the environment. What is the basic design of proteins that supports all of these properties? Recent work suggests that rather than direct physical analysis, statistical analysis of genome sequences provides a powerful and general approach to this problem. Using different methodologies, this approach has revealed both direct structural contacts as well as collective functional modes within protein structures. In this talk, I will present the current state of these approaches and the possibility of unifying them into a single theoretical framework for representing the evolutionary design of proteins.

Thursday, January 24, 2019  
4:10 p.m.  
Room 102  
McLennan Physical Laboratories  
60 St. George Street, Toronto, Ontario

*Coffee and cookies will be served in  
the Physics Lounge at 3:45 p.m.*  
[www.physics.utoronto.ca/colloquium](http://www.physics.utoronto.ca/colloquium)