



## BiophysTO Lunchtime Seminar Series

### Date

Thursday, April 21 2022  
12:00 – 1:00 pm

Host: Jeremy Rothschild

## Pankaj Mehta

Department of Physics  
Boston University

## Randomness, Complexity, and the Biological Frontier

The towering successes of twentieth century theoretical physics were marked by two guiding principles: the importance of symmetry and the centrality of minimization principles and energy functionals reflecting equilibrium dynamics. Yet, how we can exploit these principles to develop a theory of living systems is unclear since the biological world is composed of heterogeneous, interacting components operating out of equilibrium. For these reasons, theoretical biological physics requires new ideas that move beyond these two theoretical pillars. Through examples from microbial ecology and the gene networks governing cell fate, I will argue that one possible strategy for taming biological complexity is to embrace ideas from random matrix theory and the physics of disordered systems. I will show how, at their core, many of these problems can be thought of as generalized constraint-satisfaction problems, hinting at a new theoretical paradigm for tackling disparate problems across biology.

Zoom Link: <https://utoronto.zoom.us/j/83793936562>



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