



## Arup Chakraborty

Robert T. Haslam Professor of Chemical Engineering, and  
Professor of Physics, Chemistry, and Biological Engineering at MIT

# HOW TO HIT HIV WHERE IT HURTS

**Thursday, April 26, 2018**

**Reception, 4-4:30 p.m., Burton D. Morgan Cafe**

**Lecture, 4:30-5:30 p.m., Burton D. Morgan, Room 121**

Vaccination has saved more lives than any other medical procedure. But, some pathogens have evolved which have defied successful vaccination using the empirical paradigms pioneered by Pasteur and Jenner. Professor Chakraborty will describe how bringing together theoretical/computational approaches from physics and engineering, especially statistical mechanics, with immunology is beginning to confront this challenge by developing some of the principles necessary for rational design of vaccines that may eliminate these scourges. One characteristic of many pathogens for which successful vaccines do not exist is that they present themselves in various guises. HIV is an extreme example because of its high mutability, and it continues to wreak havoc, especially in developing countries. He will describe the development of models to translate data on HIV protein sequences to knowledge of the HIV fitness landscape, and tested the resulting predictions against in vitro and clinical data (with collaborators). Based on these studies, a therapeutic T cell-based vaccine was designed, which is now being advanced to pre-clinical studies in monkeys. He will also describe work pertinent to how vaccination may induce broadly neutralizing antibodies that can neutralize diverse HIV strains – this work lies at a crossroad of immunology, evolutionary biology, and statistical physics.



Arup K. Chakraborty is the Robert T. Haslam Professor of Chemical Engineering and a professor of physics, chemistry and biological engineering at the Massachusetts Institute of Technology. He was the founding director of MIT's Institute for Medical Engineering and Science; a founding steering committee member of the Ragon Institute of MIT, MGH and Harvard; and an associate member of the Broad Institute of MIT and Harvard.

After obtaining his Ph.D. in chemical engineering and postdoctoral studies, Chakraborty joined the faculty at the University of California at Berkeley in 1988. In 2005, he moved to MIT. For the last two decades, Chakraborty's work has focused on the intersection of immunology and the physical and engineering sciences, more specifically, statistical mechanics and immunology. He has received numerous honors for his interdisciplinary work, including the NIH Director's Pioneer Award and the E.O. Lawrence Medal for Life Sciences from the U.S. DOE, and has been appointed to three branches of the U.S. National Academies.

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