The Stoichiometry of HIV Entry and Neutralization

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Abstract:
Viruses are not able to replicate by themselves, but they manipulate their host cells to produce offspring according to the genetic code they provide. For this end, the virus has to enter the cell. The Human Immunodeficiency Virus, HIV, has spikes on its surface that consist of three identical envelope proteins. These spikes attach to target cell receptors and induce the infection of the cell. To prevent the infection, the immune system elicits antibodies that bind to specific structures on the envelope proteins. If the number of spikes necessary for infection and the number of antibodies binding to one spike such that the spike is rendered non-functional are known, one can estimate the number of antibodies needed to neutralize one virion or a population of virions. In my talk, I will present an experimental setup that allows the estimation of the number of spikes needed for viral entry and the number of antibodies needed to neutralize one single spike in combination with a theoretical framework. These quantities will then be used to derive a mathematical description of the neutralization of one single virion and a whole virion population.