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How the Translocation Dynamics of DNA in an Oscillating Electric Field change with Frequency[1] THOMAS LONGO, Villanova Univ, RHYS DUFF, ZACHARY DELL, INING JOU, MURUGAPPAN MUTHUKUMAR, University of Massachusetts Amherst — To make DNA sequencing more efficient and economical one proposed method has been to use nanopores. In nature, nanopores are the gateways that exist on a cells membrane, and are used by proteins which pass through them. By artificially creating these nanopores in a salt solution we can measure the current flow of the salt ions that pass through the nanopore, and if there is a strand of ssDNA in the nanopore, the current measured will change in accordance with the type of base that is in the constriction point, or the narrowest point, of the nanopore. In doing this, theoretically, we can completely sequence any strand of DNA that goes through the nanopore. However, there are two main problems with this method; the DNA translocates too quickly to measure accurately and nearby bases inside the constriction point influence the output current. My project seeks to better understand this process through molecular dynamics simulations. In my simulations, I will be testing whether applying an alternating current to the system will slow the translocation time of the ssDNA, and thereby, increase the accuracy of the sequencing process. In addition, I will be looking for the optimal frequency of the alternating current to maximize the length of the translocation time.

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