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Protein bond rupture measured by AFM and the energy landscape problem PETER HOFFMANN, ESSA MAYYAS, LINDSAY RUNYAN, Wayne State University — The measurement of protein interaction provides an intriguing opportunity for Atomic Force Microscopy (AFM)-based force measurements. The AFM has the advantage that it is relatively easy to use and widely available. However, the interpretation of the force data is lagging behind the experimental capabilities of the technique. In this talk, I will present some recent results of rupture force measurements between two proteins, and discuss our efforts to interpret the resulting data in terms of the underlying energy landscape. We performed measurements on matrix metalloproteases and their natural inhibitors at pulling speeds ranging over 3 orders of magnitude (30-48000 nm/s). However, we found that commonly used theory to interpret such data is inadequate and does not capture the physics of the problem. Consequently, data analysis based on such theories leads to highly erroneous results. We will discuss our attempts to improve the theory and present parameters extracted from the data that reflect the underlying energy landscape of the studied protein-protein interaction.

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