

Abstract Submitted  
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**Single Enzyme Pathways and Substrate Fluctuations** MARIANNE STEFANINI, Arizona State University, ALAN MCKANE, The University of Manchester, England, TIMOTHY NEWMAN, Arizona State University — In this talk we discuss the validity of the well-known Michaelis-Menten equation (MME), which is used to connect enzyme-substrate reaction rate to substrate concentration. In particular, we are interested in the role of stochastic fluctuations at very low enzyme concentrations, and whether the MME needs to be modified in this case. We find that the MME is valid if the concentration of substrate molecules is maintained at a constant level with microscopic precision (using a Maxwell Demon). However, if this concentration is maintained only on average (by some macroscopic means) then the MME fails and is replaced by a new and fairly simple form. Interestingly, this new form can distinguish between enzyme reactions which occur via a single or multiple pathways, and may therefore be of interest to experimentalists probing intra-molecular enzyme kinetics.

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