

# Bayou Science & Mathematics Colloquium

Hosted by the College of Science & Engineering

Thursday, October 12, 2017 Bayou 2106, 12:00 Noon – 1:00 PM

## Understanding Molecular Mechanisms of Biological Error Correction

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One of the most fascinating features of biological systems is the ability to sustain an extraordinary high accuracy of all major cellular processes despite the stochastic nature of underlying chemical processes. It is widely believed that such low errors are the result of the error correcting mechanism known as kinetic proofreading. However, there are contradicting views on the balance of speed and accuracy in biological processes. We developed a comprehensive theoretical framework that allowed us to investigate the mechanisms of the proofreading using the method of first-passage processes. With this framework, we simultaneously analyzed speed and accuracy of the two fundamental biological processes, DNA replication and tRNA selection during the translation. The results indicate that speed-accuracy trade-off is not always observed, as usually assumed. However, when the trade-off is present, the biological systems tend to optimize the speed rather than the accuracy of the processes, as long as the error level is tolerable. Additional constraints due to the energetic cost of proofreading might also play an important role in the error correcting process. We also found that accuracy of enzymatic processes is governed by kinetic factors. Our theoretical findings provide a new microscopic picture of how complex biological processes are able to function so fast with a high accuracy.

**Host: Dr. Mohammad B. Rashid**

**Refreshments will be served in the hallway of Bayou 2106 from 11:30AM – 12:00Noon!**

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Any person needing an accommodation for a disability to participate in this program should contact the sponsoring organization at (281) 283-3770 to make the necessary arrangements.



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