Aula Magna del Dipartimento
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Understanding Molecular Mechanisms of Biological Error Correction

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Abstract: 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 a kinetic proofreading. It involves frequent resetting of the biological processes in order to increase its accuracy. However, there are contradicting views on the balance of speed, accuracy and energy cost in biological processes that follow the kinetic proofreading mechanisms. Recently, a comprehensive theoretical framework that is able to analyze the optimization of biological processes has been proposed. Surprisingly, it was found that 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 a role in the error correcting process. The physics of error correction mechanisms in biological systems is presented and discussed from the molecular point of view.