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Noise Induced Biological Adaptation Differs between Analogous Differentiation Circuits MARK KITTISOPIKUL, Green Ctr. for Sys. Biology and Dept. of Pharm., UT Southwestern, Dallas, TX USA75390, ANDREW MUGLER, FOM Institute for Atomic and Molecular Physics (AMOLF), Science Park 104, Amsterdam, The Netherlands, ALEKSANDRA M. WALCZAK, Laboratoire Physique Theorique, Ecole Normale Supérieure & CNRS, 24 rue Lhomond, 75231 Paris Cedex 05, France, TOLGA ÇAGATAY[1], CHRIS H. WIGGINS, Dept. of Applied Physics and Applied Math., Ctr. for Comp. Biology and Bioinformatics, Columbia University, New York, NY 10027, GÜROL SÜEL[2] — Analogous genetic regulatory networks with alternate orders of activation and repression can have comparable functions and generate similar average dynamics but differ in terms of stochastic variability (noise). Here we examine if noise affects biological adaptation to stress by comparing the induction dynamics of the native *B. subtilis* competence differentiation network to a synthetic network implemented *in vivo* by Çagatay et al. that recapitulates mean dynamics but differs in noise. We use fluorescence microscopy to study the networks in live cells and stochastic models solved via the spectral method. The adaptability of the organism is affected by the circuit's ability to access different dynamic regimes as a function of stress.

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