Abstract Submitted
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Effect of Temperature on Synthetic Positive and Negative Feedback Gene Networks[1] DANIEL A. CHARLEBOIS, Laufer Center for Physical and Quantitative Biology, Stony Brook University, SYLVIA MARSHALL, Laufer Center for Physical and Quantitative Biology, Department of Biochemistry, Stony Brook University, GABOR BALAZSI, Laufer Center for Physical and Quantitative Biology, Department of Biomedical Engineering, Stony Brook University — Synthetic biological systems are built and tested under well controlled laboratory conditions. How altering the environment, such as the ambient temperature affects their function is not well understood. To address this question for synthetic gene networks with positive and negative feedback, we used mathematical modeling coupled with experiments in the budding yeast *Saccharomyces cerevisiae.* We found that cellular growth rates and gene expression dose responses change significantly at temperatures above and below the physiological optimum for yeast. Gene expression distributions for the negative feedback-based circuit changed from unimodal to bimodal at high temperature, while the bifurcation point of the positive feedback circuit shifted up with temperature. These results demonstrate that synthetic gene network function is context-dependent [1]. Temperature effects should thus be tested and incorporated into their design and validation for real-world applications. [1] S. Cardinale, A.P. Arkin, Contextualizing context for synthetic biology – identifying causes of failure of synthetic biological systems. Biotechnology Journal, 7:856-866 (2012).

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