

Abstract Submitted
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Temperature control of molecular circuit switch responsible for virulent phenotype expression in uropathogenic *Escherichia coli*¹
MICHAEL SAMOILOV, QB3: California Institute for Quantitative Biosciences, UC Berkeley — The behavior and fate of biological organisms are to a large extent dictated by their environment, which can be often viewed as a collection of features and constraints governed by physics laws. Since biological systems comprise networks of molecular interactions, one such key physical property is temperature, whose variations directly affect the rates of biochemical reactions involved. For instance, temperature is known to control many gene regulatory circuits responsible for pathogenicity in bacteria. One such example is type 1 fimbriae (T1F) – the foremost virulence factor in uropathogenic *E. coli* (UPEC), which accounts for 80-90% of all community-acquired urinary tract infections (UTIs). The expression of T1F is randomly ‘phase variable’, i.e. individual cells switch between virulent/fimbriate and avirulent/afimbriate phenotypes, with rates regulated by temperature. Our computational investigation of this process, which is based on FimB/FimE recombinase-mediated inversion of *fimS* DNA element, offers new insights into its discrete-stochastic kinetics. In particular, it elucidates the logic of T1F control optimization to the host temperature and contributes further understanding toward the development of novel therapeutic approaches to UPEC-caused UTIs.

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