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Consequences of Irreversibility in Fundamental Models of Transcription STUART SEVIER, HERBERT LEVINE, Rice University — The ability to watch biochemical events play out at the single-molecule level has led to the discovery that transcription occurs in a noisy, “bursty” manner. Recently, as the single-molecule lens is placed over a larger number of organisms and genes, relationships between mean expression and noise beyond the “bursty” paradigm have emerged. Through a master-equation formulation of transcription we have found that many powerful physical principles relating to irreversibility seem to play a central role in the newly uncovered trends. Specifically, the relationships between mean expression and noise appears to be a direct consequence of network currents. We discuss how emphasizing the underlying principles in the models can explain recent experimental data and lead to a generalized view of transcription.

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