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Distinguishing Feedback Mechanisms in Clock Models[1] ALEXANDER GOLDEN, DAVID LUBENSKY, University of Michigan, Ann Arbor — Biological oscillators are very diverse but can be classified based on dynamical motifs such as type of feedback. The S. Elongatus circadian oscillator is a novel circadian oscillator that can operate at constant protein number by modifying covalent states. It can be reproduced in vitro with only 3 different purified proteins: KaiA, KaiB, and KaiC. We use computational and analytic techniques to compare models of the S. Elongatus post-translational oscillator that rely on positive feedback with models that rely on negative feedback. We show that introducing a protein that binds competitively with KaiA to the KaiB-KaiC complex can distinguish between positive and negative feedback as the primary driver of the rhythm, which has so far been difficult to address experimentally.

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