February 24, 2026

Dear Editor,

We submit for your consideration the manuscript entitled "**AR(2) Eigenvalue Modulus as a Measure of Temporal Persistence in Gene Expression: Circadian Hierarchy Emerges from Two Coefficients**" for publication in *PLOS Computational Biology*.

Summary. We demonstrate that the eigenvalue modulus of a second-order autoregressive model—a standard tool from econometrics and control theory—measures temporal persistence in gene expression and blindly recovers the known circadian hierarchy (clock > target > other) across 4 species, 12 mouse tissues, and 37 datasets. The method requires no biological labels: two coefficients fitted by ordinary least squares produce a single number per gene that captures how much the gene's past determines its future.

Significance. No single metric has previously captured circadian hierarchy from expression data alone. The eigenvalue modulus connects gene expression to the same mathematical framework used by three Nobel Prize-winning discoveries (Sims 2011 in economics, Hasselmann 2021 in climate science). The eleven-analysis robustness suite, ODE model validation, cross-species replication, and BMAL1-knockout causal validation provide comprehensive evidence that the metric is biologically meaningful.

Reproducibility. All source datasets are publicly available from NCBI GEO. Complete AR(2) results for all genes across all datasets are provided as supplementary files. The PAR(2) Discovery Engine web application provides interactive access to all results.

This manuscript has not been submitted elsewhere and all work is original.

Sincerely,

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