

Publications & Research Activities

Publications

[†] indicates co-first authors.

- Al-Radhawi, M. A., Manoj, K., **Jatkar, D. D.**, Duvall, A., Del Vecchio, D., & Sontag, E. D. (2024, December). Competition for binding targets results in paradoxical effects for simultaneous activator and repressor action. In 2024 IEEE 63rd Conference on Decision and Control (CDC) (pp. 5579–5585). IEEE.

Preprints

- Jatkar, D. D.**[†], Al-Radhawi, M. A.[†], Voigt, C. A., & Sontag, E. D. (2025). Modeling and minimization of dCas9-induced competition in CRISPRi-based genetic circuits. *bioRxiv*. <https://doi.org/10.1101/2025.11.05.686856>
- de Oliveira, A. C. B., **Jatkar, D. D.**, & Sontag, E. D. (2025). On the convergence of overparameterized problems: Inherent properties of the compositional structure of neural networks. *arXiv preprint arXiv:2511.09810*. [Submitted to Learning for Dynamics and Control (L4DC) 2026]
- Jatkar, D. D.**[†], Manoj, K.[†], Sontag, E. D., & Del Vecchio, D. (2025). Paradoxical gene regulation explained by competition for genomic sites. *bioRxiv*. <https://doi.org/10.1101/2025.11.27.691022>
- Tran, A. P.[†], **Jatkar, D. D.**[†], Al-Radhawi, M. A., Ernst, E., & Sontag, E. D. (2025). Optimization of heuristic logic synthesis by iteratively reducing circuit substructures using a database of optimal implementations. *bioRxiv*. <https://doi.org/10.1101/2025.11.28.691216>
- Duvall, A., Al-Radhawi, M. A., **Jatkar, D. D.**, & Sontag, E. D. (2024). Interplay between contractivity and monotonicity for reaction networks. *arXiv preprint arXiv:2404.18734*. [Submitted with revisions to SIAM Journal on Applied Dynamical Systems]

Papers To Be Submitted (Available Upon Request)

- Jatkar, D. D.**[†], de Oliveira, A. C. B.[†], Stohr, A., Woolston, B. M., & Sontag, E. D. Optimal engineering of a symbiotic aerobe-anaerobe coculture.
- Jatkar, D. D.**[†], de Oliveira, A. C. B.[†], & Sontag, E. D. Numerical methods for linearly constrained optimizations satisfying a weak form of the Polyak-Łojasiewicz inequality.
- Jatkar, D. D.**, & Sontag, E. D., Grunberg, T. W., Permutation symmetry breaking enables fast and complete enumeration of logic circuits.
- Zhou, G., **Jatkar, D. D.**, Gasparrini, W., Stohr, A., & Woolston, B. M. A synthetic symbiotic co-culture of aerobes and anaerobes for bioproduction from CO₂ and H₂.

Conference Talks and Posters

- Jatkar, D. D.**, Manoj, K., Sontag, E. D., & Del Vecchio, D. (2025, June). Retroactivity and binding site competition leads to repression by an activator [Poster presentation]. Synthetic Biology: Engineering, Evolution & Design (SEED) 2025, Houston, TX, USA.
- Jatkar, D. D.**, Al-Radhawi, M. A., & Sontag, E. D. (2024, October). Modeling and minimization of dCas9-induced competition in CRISPRi-based genetic circuits [Poster presentation]. 7th International Conference on CRISPR Technologies, San Diego, CA, USA.
- Jatkar, D. D.**, Zhou, G., Stohr, A., Gasparrini, W., Sontag, E. D., & Woolston, B. M. (2024, August). Engineering syntrophy in an anaerobe-aerobe co-culture for waste gas valorization [Poster presentation]. Society for Industrial Microbiology & Biotechnology (SIMB) Annual Meeting 2024, Boston, MA, USA.
- Jatkar, D. D.**, Duvall, A., Levine, E., Libby, E. A., & Sontag, E. D. (2024, June). Competition for transcriptional resources in genetic circuits [Poster presentation]. Boston Bacterial Meeting (BBM) 2024, Boston University, Boston, MA, USA.
- Jatkar, D. D.**, Zhou, G., & Woolston, B. M. (2023, June). Elucidating interactions in engineered microbial communities towards renewable biofuel production [Talk]. American Chemical Society Northeast Regional Meeting (ACS NERM) 2023, Boston, MA, USA.