JOHNS HOPKINS
BIOMEDICAL ENGINEERING

BME Seminar Series

Seth Shipman, PhD

Visiting Assistant Professor
UCSF and the Gladstone Institues in San Francisco

Monday, October 24, 2022
1:00 p.m.
Traylor 709

Faculty host: Reza Kalhour

Hijacking Bacterial Retroelements for Molecular Technology

Abstract: The use of chemically synthesized DNA sequences has accelerated biomedical research. We now recode genomes, barcode molecular events, and modify cell proteomes using synthesized DNA. However, limitations in synthetic DNA delivery prevent us from realizing the full power of these approaches. Unlike engineered RNA or protein, which we may produce inside cells, synthetic DNA must be physically delivered to the cells that we aim to modify, using methods that are inefficient, lack specificity, and offer no temporal control. As a solution, my lab is harnessing bacterial retroelements, called retrons, to produce designed DNA inside cells by reverse transcription. I will present work showing how we have domesticated and modified retrons for use as a platform biotechnology via high-throughput, quantitative assays. I will also highlight new approaches that the retron enables, including precise and trackable genome editing and molecular recording of transcriptional events.

Bio: Seth Shipman is an Assistant Professor of Bioengineering at UCSF and the Gladstone Institutes in San Francisco. His lab creates new molecular biotechnology to overcome the technical limitations that hold us back from fully understanding and treating human disease. Seth received his BA from Wesleyan University and his PhD in Neuroscience from UCSF. As a postdoc he worked with George Church at Harvard Medical School, using synthetic biology encode data in the genomes of living cells.