**SUMMARY PLOTS**

A group of graphs with lines

AI-generated content may be incorrect.

All initial sequences in this study begin with five pairs of recombinase sites and are subjected to 20 rounds of recombinase activity, where each round (or "stage") represents a single recombinase event.

**Key Features of Each System:**

* **IS110:**  
  The IS110 initial sequence is designed so that at every stage, only one site contains the active element GAMMA. This GAMMA site alternates its reaction partner between ALPHA and BETA in successive stages. After each recombinase event, one active A-ALPHA or B-BETA site is lost, ensuring that the process continues without excision until all possible reactions are exhausted. This design enables IS110 to generate a large variety of barcodes and maintain high entropy throughout the process.
* **Elowitz’s trits:**  
  This system produces fewer distinct barcodes, but the entropy of the barcode distribution converges to a higher value, indicating a more even spread among possible outcomes.
* **Polylox:**  
  Polylox achieves a high number of unique barcodes, but its entropy converges to a lower value, suggesting that a few barcode types become dominant.

**Elowitz's trits sequence**

A line graph with black dots

AI-generated content may be incorrect.A graph with a line and numbers

AI-generated content may be incorrect.

A line graph with numbers and lines

AI-generated content may be incorrect.

A group of colored lines

AI-generated content may be incorrect.

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