



Center for Theoretical Biological Physics

SEMINAR

"Temporal control of self-organized pattern formation without morphogen gradients in bacteria"

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Abstract: Diverse mechanisms have been proposed to explain biological pattern formation. Regardless of their specific molecular interactions, the vast majority of these mechanisms require morphogen gradients as the spatial cue, which are either predefined or generated as part of the patterning process. However, using *Escherichia coli* programmed by a synthetic gene circuit, we demonstrate here the generation of robust, self-organized ring patterns of gene expression in the absence of an apparent morphogen gradient. Instead of being a spatial cue, the morphogen serves as a timing cue to trigger the formation and maintenance of the ring patterns. The timing mechanism enables the system to sense the domain size of the environment and generate patterns that scale accordingly. Our work defines a novel mechanism of pattern formation that has implications for understanding natural developmental processes.