

PHYSIKALISCHES KOLLOQUIUM

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IM GROßEN HÖRSAAL



SYNTHETIC BIOLOGY - A FIELD FOR PHYSICISTS?

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Synthetic biology is the design and construction of new biological entities, such as genetic circuits, and cells, or the redesign of existing biological systems. It builds on the advances in molecular, cell, and systems biology and seeks to transform biology in the same way that, e.g., integrated circuit design transformed computing. The element that distinguishes synthetic biology from traditional biology is the focus on the design and construction of core components that can be quantitatively modeled, understood, and tuned to meet specific performance criteria and the assembly of these smaller parts and devices into larger integrated systems that solve specific biotechnological problems.

But despite significant progress in recent years, it remains a grand challenge to introduce predictable, formalized biological design principles into living organisms. The major reason rests in the astonishing complexity of a single cell: Biological systems are noisy, non-linear, and have not evolved to be easily engineered. In this context, synthetic systems help us to understand how natural biological systems function and how they operate in organisms from microbes to mammalian cells. Quantitative reasoning replaces trial and error and mathematical modeling plays an important role in this rapidly expanding field.

I will provide an overview over the field and talk about interesting approaches from the viewpoint of a physicist