Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg
Physikalisches Institut

PHYSIKALISCHES KOLLOQUIUM

AM 25. APRIL 2022 UM 17 UHR C.T.

IM GROßEN HÖRSAAL

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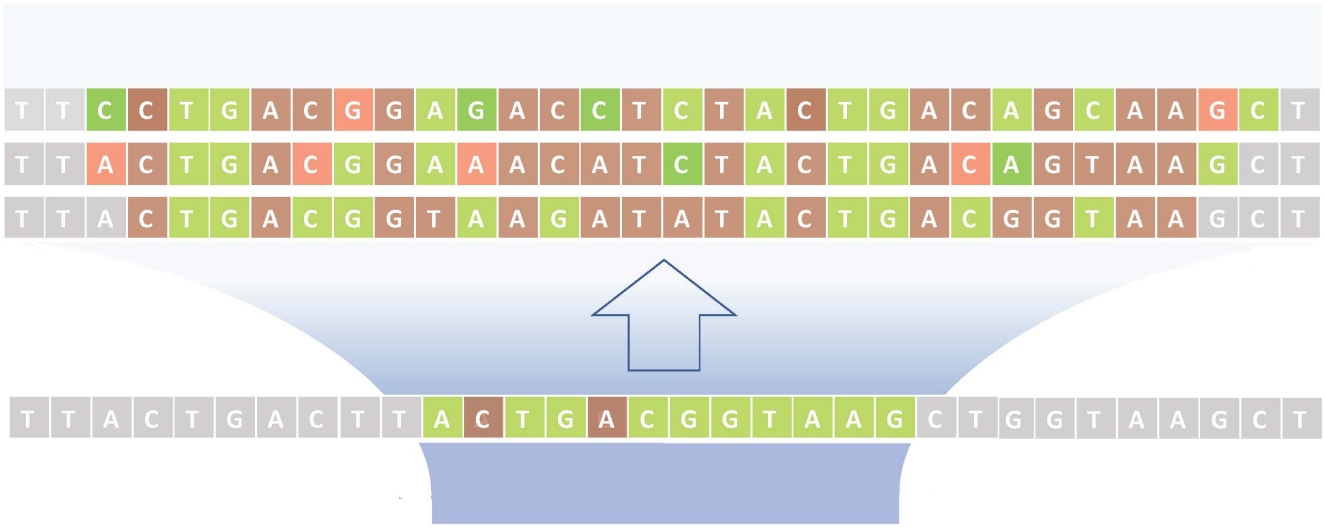

HOW DOES MOLECULAR COMPLEXITY EVOLVE?

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Biological systems have evolved to amazingly complex states, yet we do not understand in general how evolution operates to generate increasing genetic and functional complexity. We will explore this question specifically for the evolution of molecular recognition in the cell: we will discuss how information theory and biophysics drive the evolution of complex recognition systems. Molecular recognition sites are short genome segments or peptides binding a cognate recognition target of sufficient sequence similarity. We show that recognition sites, if coupled to a time-dependent target, can rapidly evolve to complex states with larger code length and smaller coding density than sites recognising a static target. We apply these results to the recognition of fast-evolving antigens by the human immune system. We discuss the emerging link between two fundamental aspects of evolution, non-equilibrium and molecular complexity.