

## Interplay of Proteins and Nucleic Acid Polymers in Compartment Formation

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens

(beendet)

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Research over the last decade has shown that the mesoscale organization of many cellular, membrane-less compartments can be described by phase separation phenomena. Most studies of the physical chemistry of cellular phase separation have focused on the interactions of protein molecules. However, it has recently become clear that phase separation inside cells is modulated by interactions between protein components and nucleic acid polymers, which together form the basis of life. The mesoscale interactions between nucleic acid polymers and proteins are not well understood, yet they drive the formation of compartments that underlie chromatin organization, and can bring distant DNA elements together to regulate gene expression, DNA repair and other nuclear functions. The objective of this project is to identify the physical and chemical principles governing macromolecular, nucleic acid-protein interactions and the formation of condensates at the mesoscale, by close integration of physics theory and biological experimentation. The integration of theory with both in vitro and in vivo measurements will lead to a more comprehensive understanding of nuclear compartmentalization and functions.

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