Abstract Submitted
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The interplay between single-stranded binding proteins on RNA secondary structure[1] YI-HSUAN LIN, RALF BUNDSCHUH, The Ohio State University — RNA-protein interactions are critical for Biology because of their regulatory effects on mRNA and protein levels. There are typically several specific protein binding sites on an RNA molecule. A protein can bind one of these sites only if the RNA folds into a structure that leaves the entire binding site free of base pairs. Therefore, a protein binding to an RNA excludes some of the originally permitted RNA structures, causing a change in the structural ensemble. Thus, the probability of another protein to bind the same RNA at a different site will change upon binding of the first protein. To discover such effects, we combine methods of RNA secondary structure prediction with models of protein-RNA interaction. We focus on an RNA molecule with two protein binding sites. The ensemble of secondary structures of random RNA sequences is considered, and numerical calculations show the existence of a semi-long-range interaction between the protein binding sites mediated by the thermodynamics of the RNA structures. A brief analytic argument for this correlation is given, and a phase transition to a high-temperature phase, possibly related to the molten-glass phase transition of secondary RNA structures, is discussed.

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