Abstract for an Invited Paper
for the MAR07 Meeting of
The American Physical Society

Aggregation and folding phase transitions of RNA molecules[1]

RALF BUNDSCHUH, The Ohio State University

RNA is a biomolecule that is involved in nearly all aspects of cellular functions. In order to perform many of these functions, RNA molecules have to fold into specific secondary structures. This folding is driven by the tendency of the bases to form Watson-Crick base pairs. Beyond the biological importance of RNA, the relatively simple rules for structure formation of RNA make it a very interesting system from the statistical physics point of view. We will present examples of phase transitions in RNA secondary structure formation that are amenable to analytical descriptions. A special focus will be on aggregation between several RNA molecules which is important for some regulatory circuits based on RNA structure, triplet repeat diseases like Huntington's, and as a model for prion diseases. We show that depending on the relative strength of the intramolecular and the intermolecular base pairing, RNA molecules undergo a transition into an aggregated phase and quantitatively characterize this transition.

[1]This work has been partially supported by the National Science foundation through grant no. DMR-0404615.