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A topological classification of RNA folds

Abstract:　After reviewing some elementary properties of RNA, we show how the RNA folding problem can be formulated exactly in terms of an NxN matrix field theory. This formulation introduces a classification of RNA structures according to their topological genus. The large N limit of this theory generates the secondary structures of RNA (planar graphs), whereas 1/N corrections are identified as pseudo-knots. We show how the RNA structures can be analyzed in terms of primitive pseudo knots of low genus and how this concept can be incorporated in Monte Carlo methods to actually predict RNA folds.

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