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Physics of local rule-based self-assembly SAHAND HORMOZ, MICHAEL BRENNER, School of Engineering and Applied Sciences, Harvard University — Recent experimental advances have opened up the possibility of equilibrium self- assembly of functionalized nanoblocks with high degree of controllable specific interactions. The notion of the number of types of components and the corresponding energetic interactions (set of local rules) needed for successful assembly has been studied from an algorithmic point of view, and applied, for example, to assembly of viral shells. Similar questions have also been asked in protein folding, in particular, on the minimum number of amino acids required for successful folding. We extend the algorithmic notion of self-assembly by accounting for its physical nature. We discuss bounds on the number of monomer types and the energetic interactions, as a function of fundamental system parameters, required for thermodynamic stability of the final structure and kinetic feasibility of assembly.

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