Map lattices coupled by collisions: chaos per lattice unit

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A natural way to understand a system on an infinite lattice is to consider its spatially periodic approximations, that is, coupled maps defined on finite boxes of sites with periodic boundary conditions. By taking an increasing sequence of boxes and understanding how various important dynamical quantities, such as entropy, escape rates in open systems, etc., scale with the size of the system it is possible to meaningfully define the amount of "chaos" per lattice unit in the infinite dimensional system. In this work, we study coupled map lattices where the interaction takes place via rare but intense 'collisions' and the dynamics on each site is given by a piecewise uniformly expanding map of the interval. Using transfer operator techniques, we derive an explicit formula for 'first collision rates' per lattice unit in the in infinite dimensional system. This is joint work with F. Sélley.