

Apparently it is possible to have chaotic behaviour in a conservative (hamiltonian) system. A HS conserves phase-space volume, but not necessarily shape. Think of kneading dough: volume is conserved, but an initial ball of raisins spreads out.

How to make an example? It needs to be a-symmetric to avoid integrability. Take a potential like

$$U(x, y) = x^2 + y^2 + \frac{a}{1 + (x - b)^2 + y^2}$$

which looks like a harmonic oscillator potential well  $x^2 + y^2$  at large scale, but has a bump at  $(b, 0)$ . Can it produce chaotic behaviour?

For simple systems, can the Lyapunov coefficient (LC) be computed locally? Sure it can, but what matters more is the *average* LC, no? Need more study here...