

Measuring the transition between nonhyperbolic and hyperbolic regimes in open Hamiltonian systems



Alexandre
R. Nieto



Euaggelos
E. Zotos



Jesús
M. Seoane



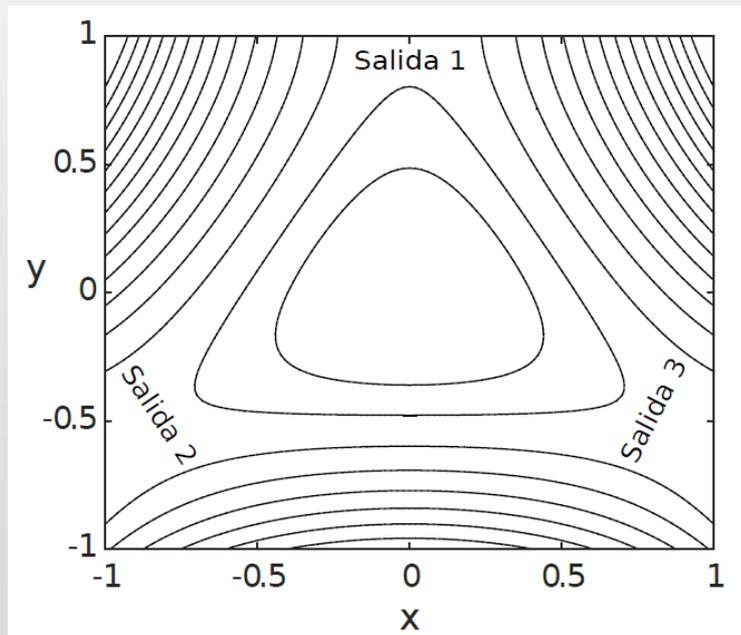
Miguel Ángel
F. Sanjuán

Hamiltoniano de Hénon-Heiles

$$\mathcal{H} = \frac{1}{2}(\dot{x}^2 + \dot{y}^2) + \frac{1}{2}(x^2 + y^2) + x^2y - \frac{1}{3}y^3$$

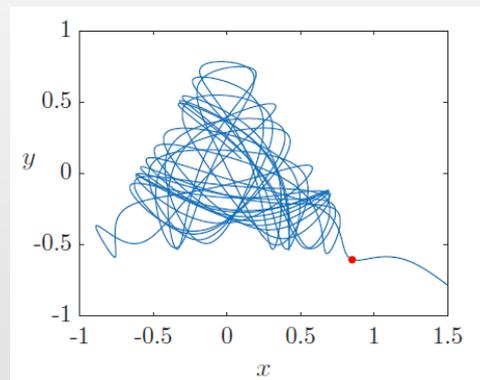
$E > 1/6$

Sistema Hamiltoniano abierto



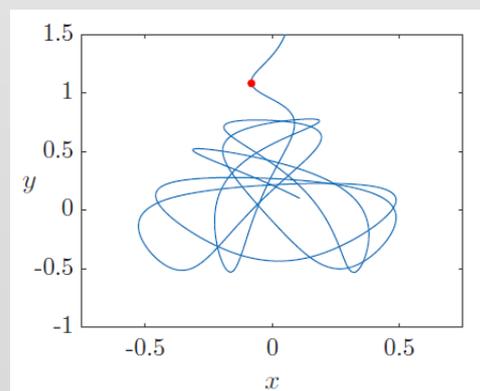
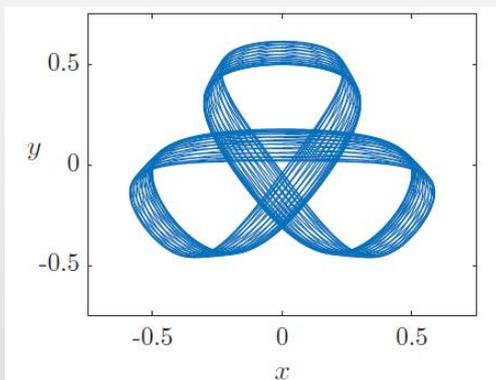
Hiperbólico

$$R(t) \sim e^{-\alpha t}$$



No-hiperbólico

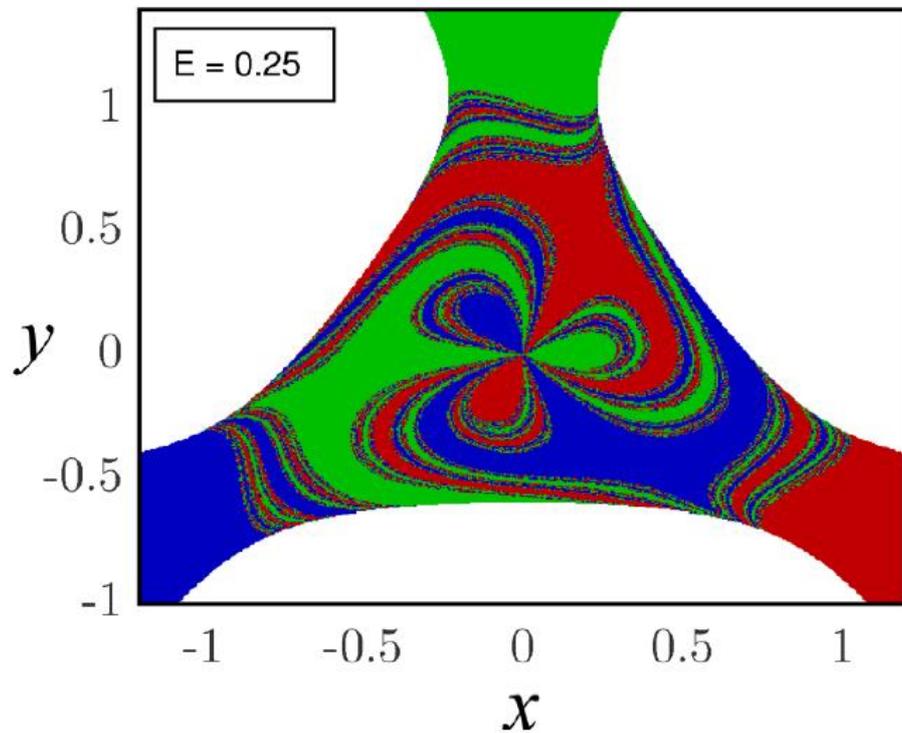
$$R(t) \sim t^{-\alpha}$$



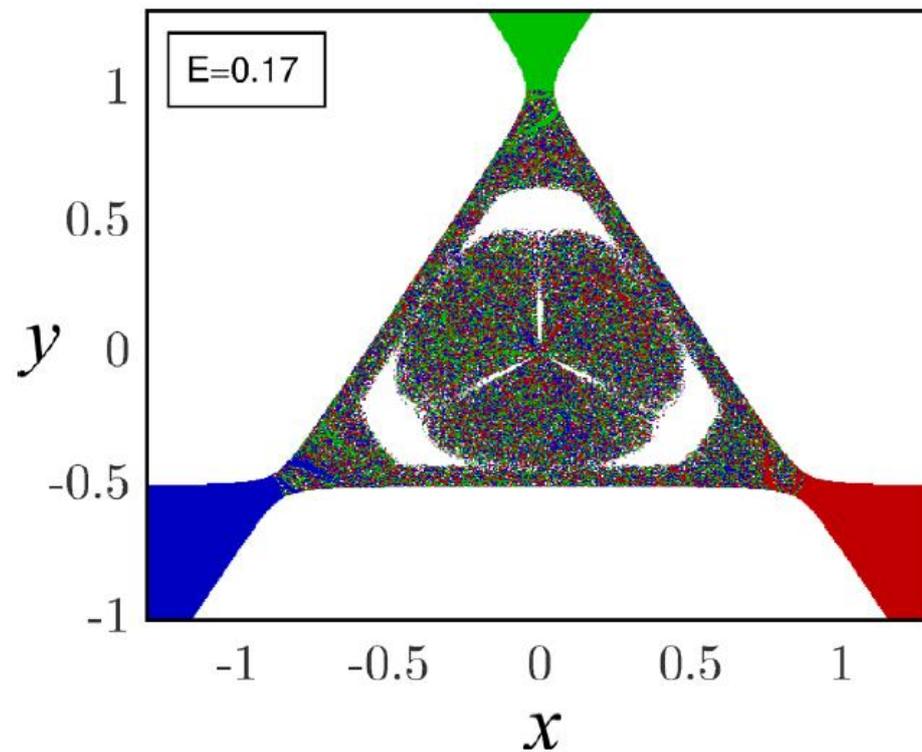
Órbitas cuasiperiódicas
toro Kolmogorov-Arnold-Moser
(KAM)

Islas KAM

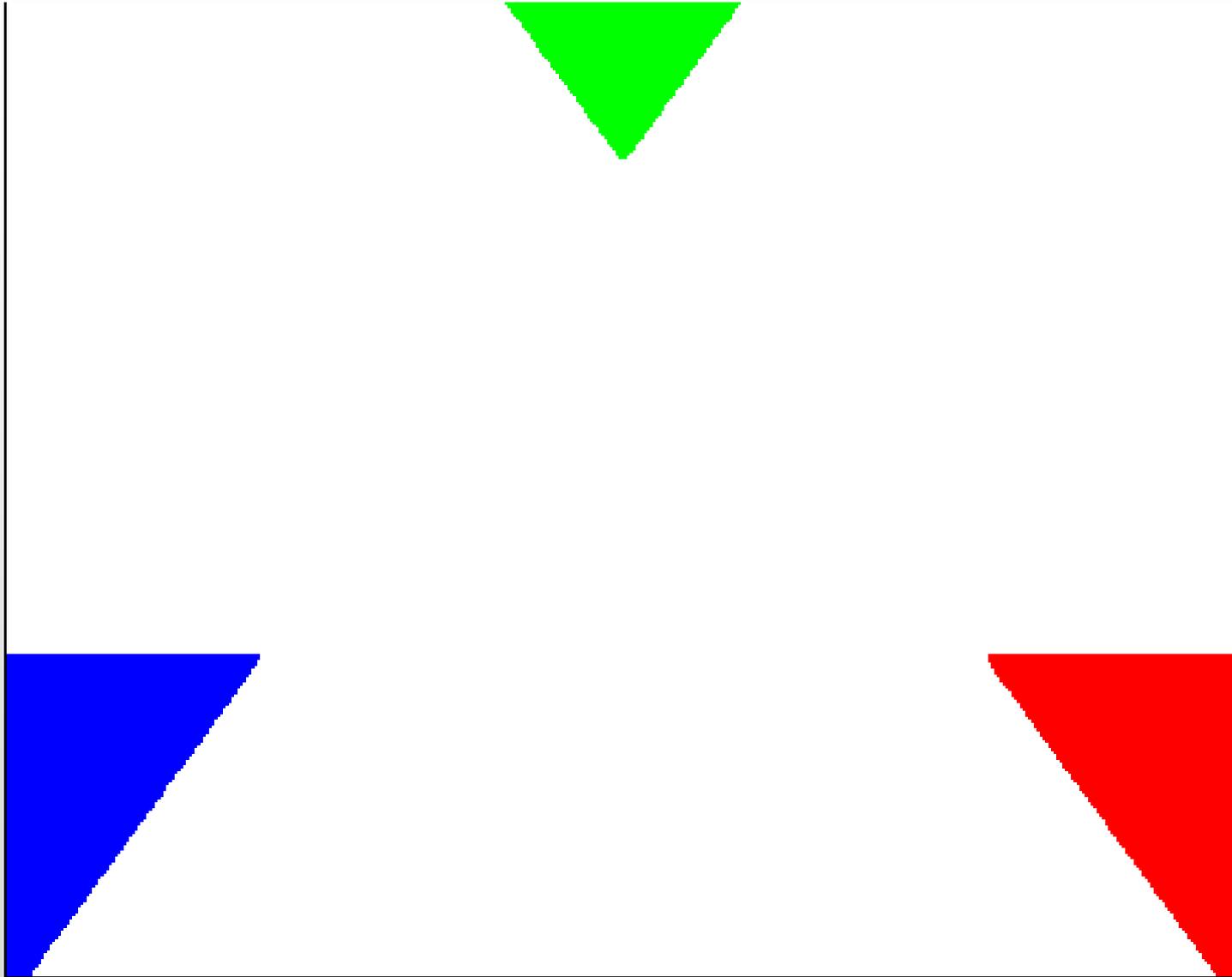
Hiperbólico



No-hiperbólico

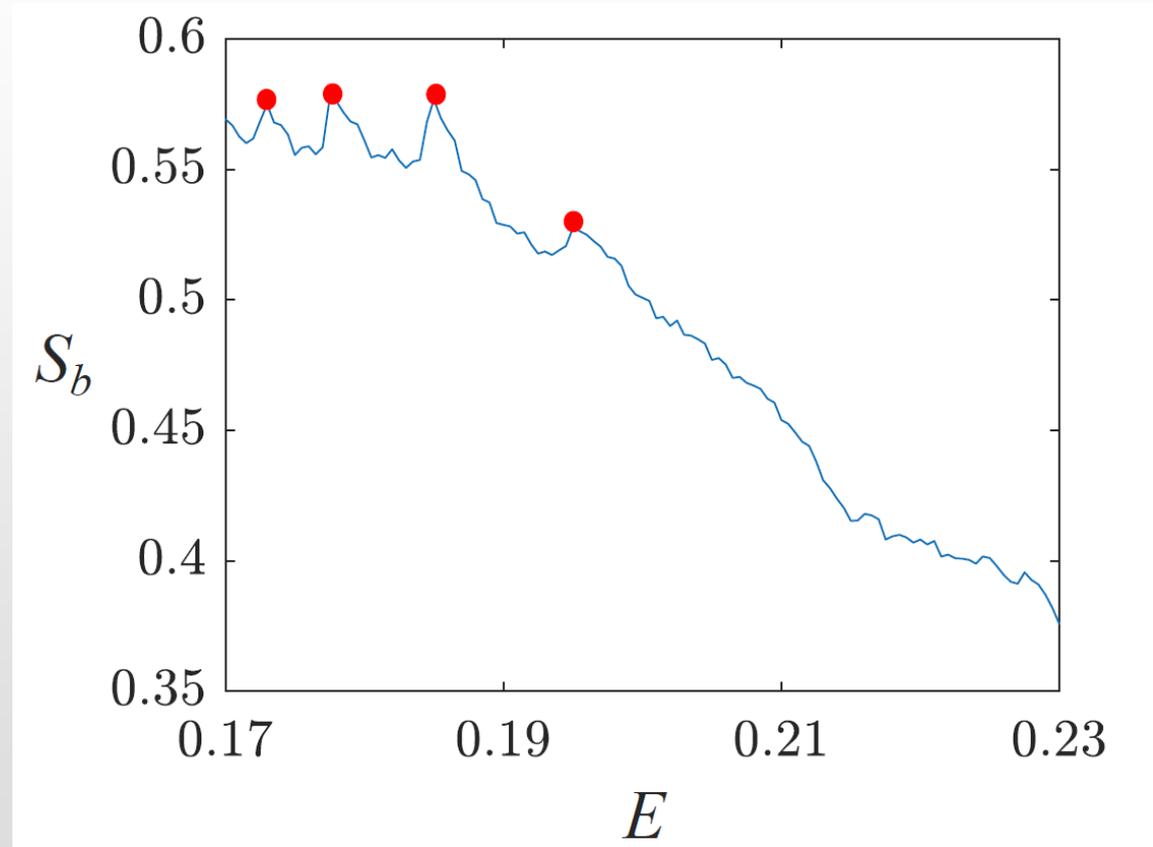


Variaciones en las islas KAM

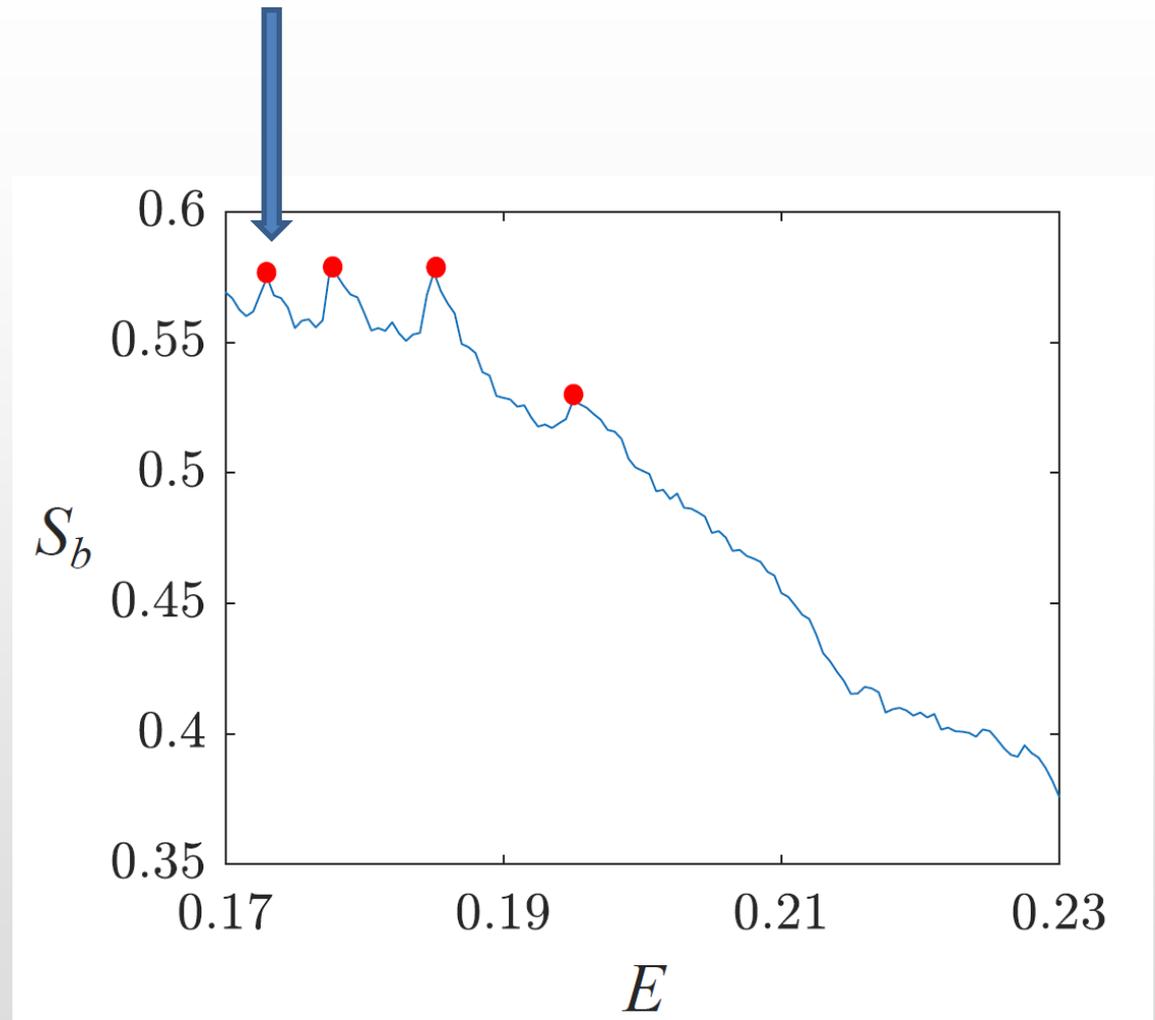


La huella de las islas KAM en la impredecibilidad

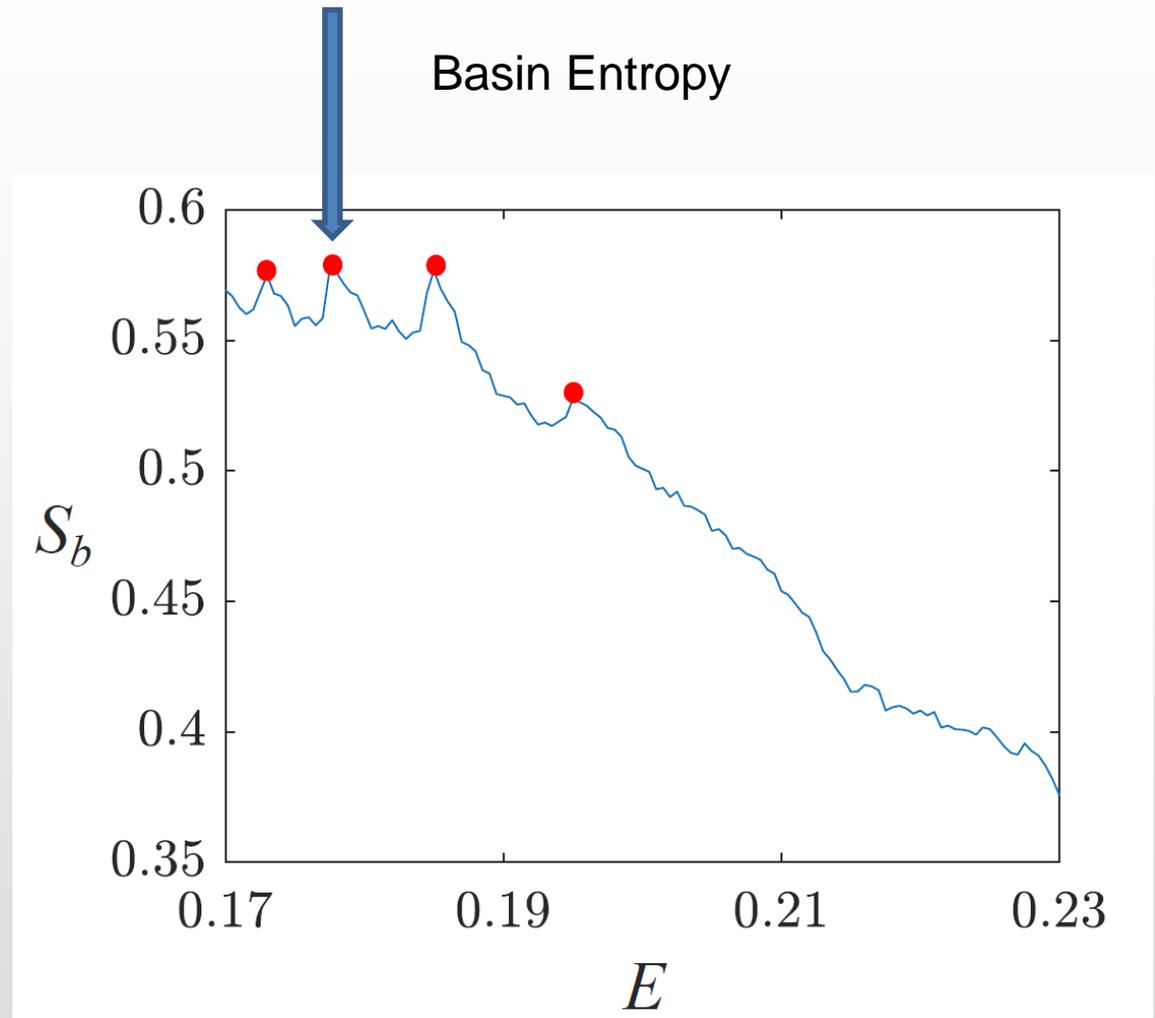
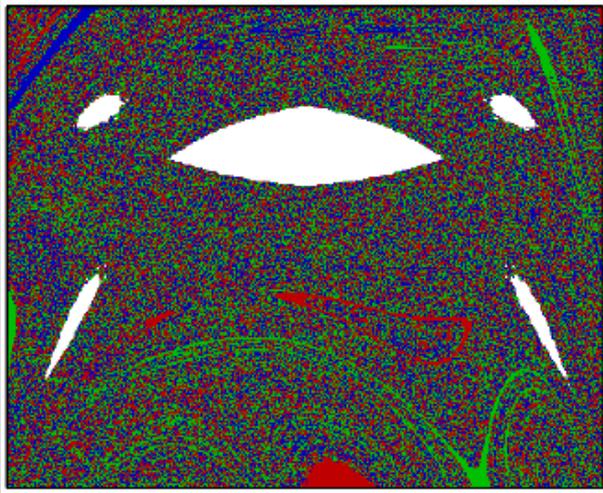
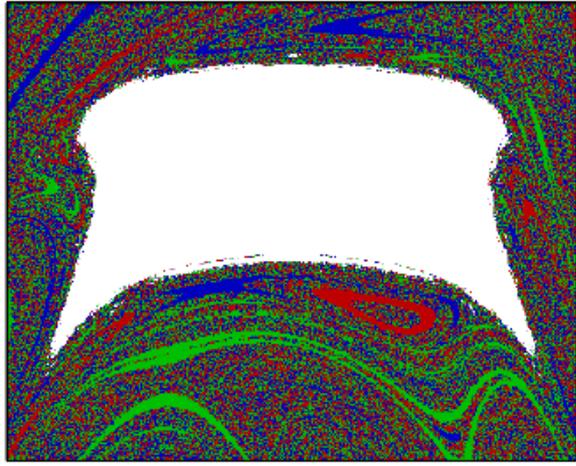
Basin Entropy



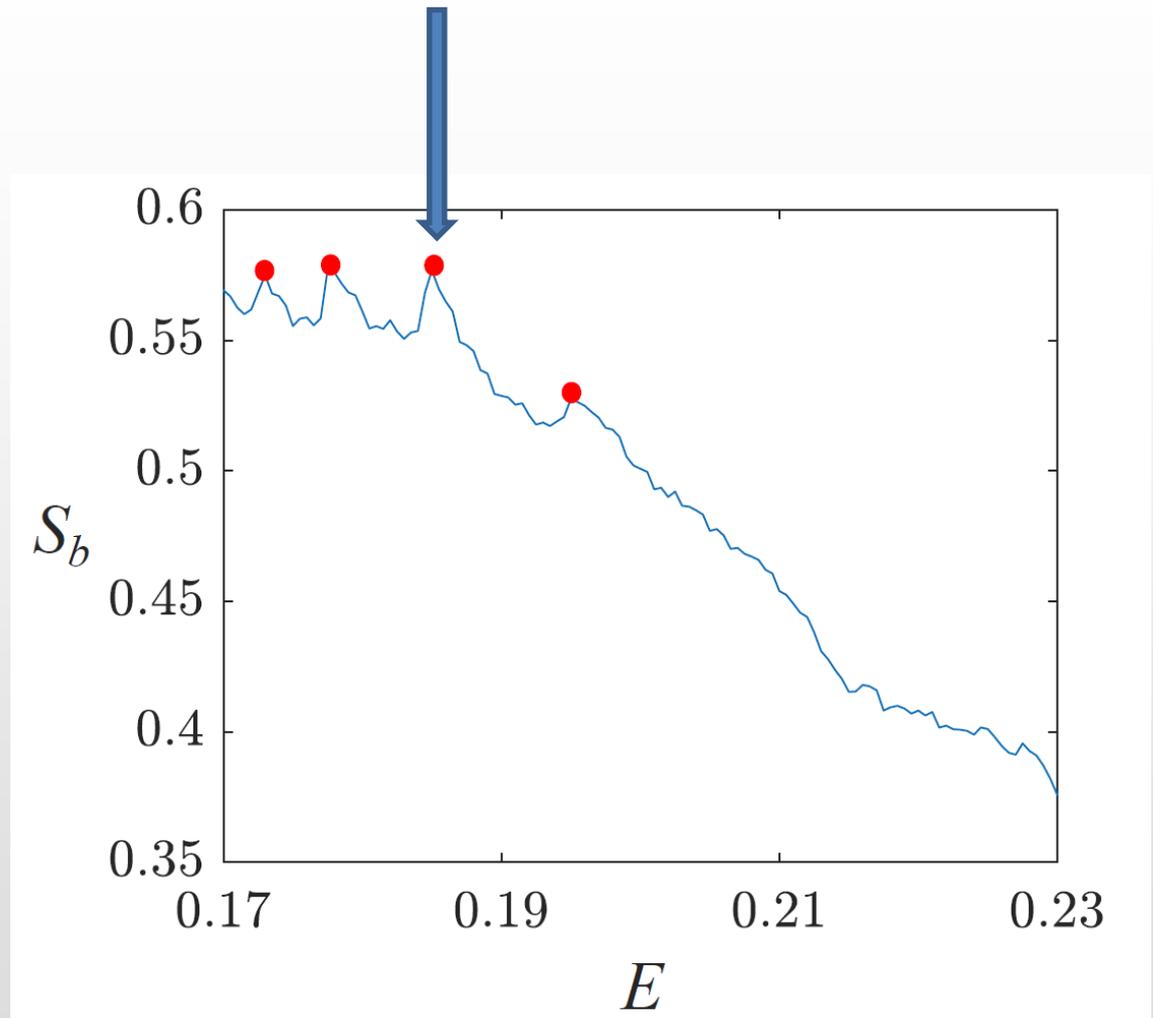
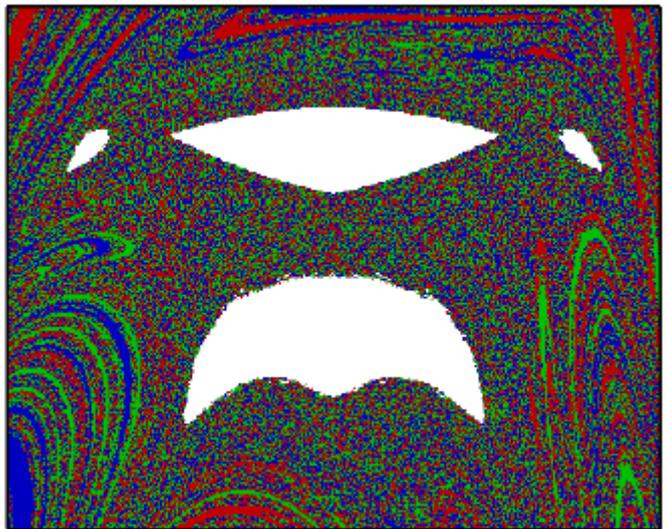
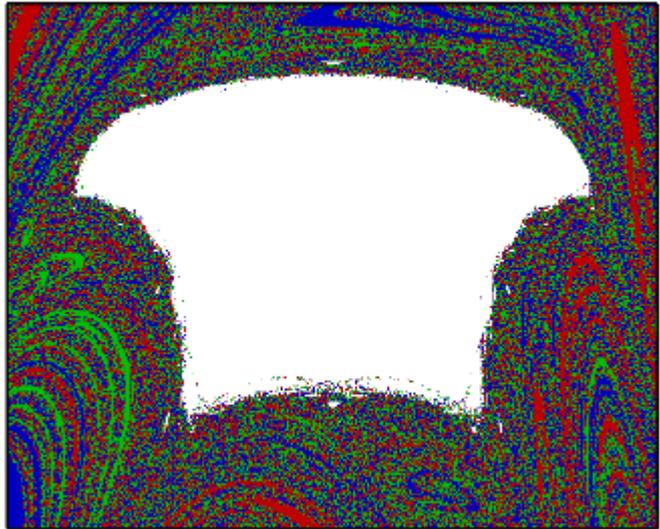
La huella de las islas KAM en la impredecibilidad



La huella de las islas KAM en la impredecibilidad



La huella de las islas KAM en la impredecibilidad



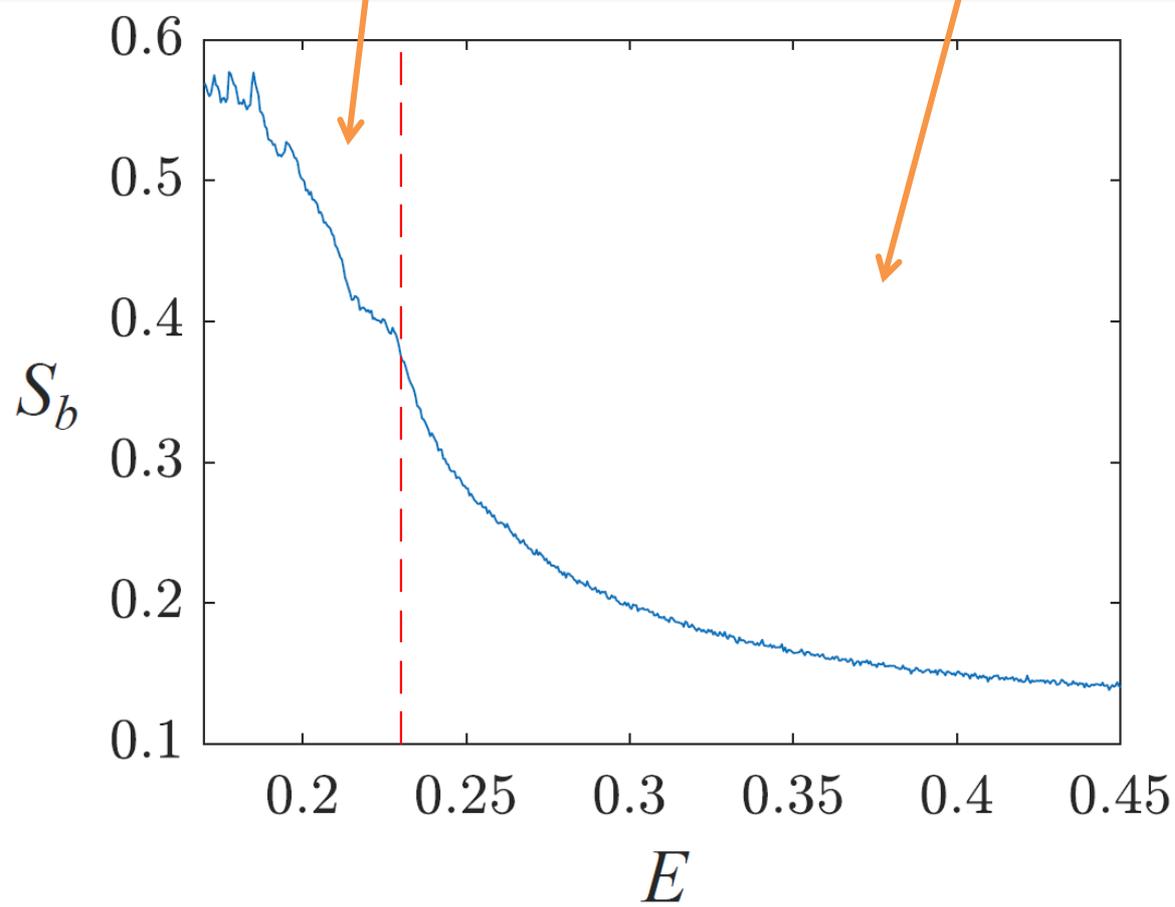
Detectando el cambio de régimen

Régimen no-hiperbólico

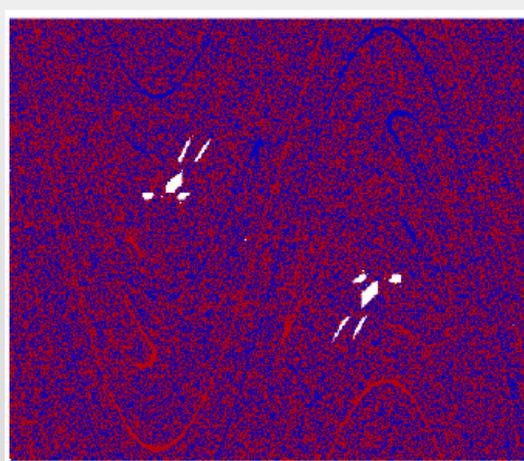
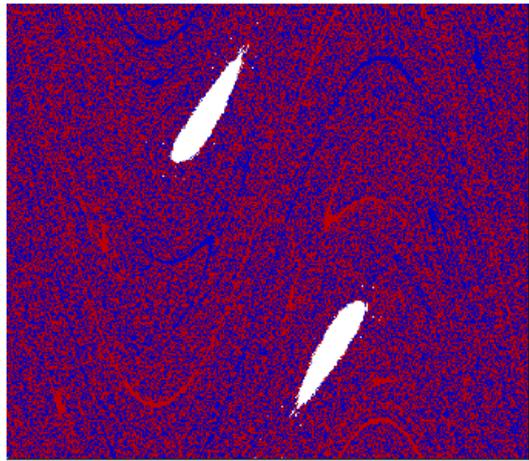
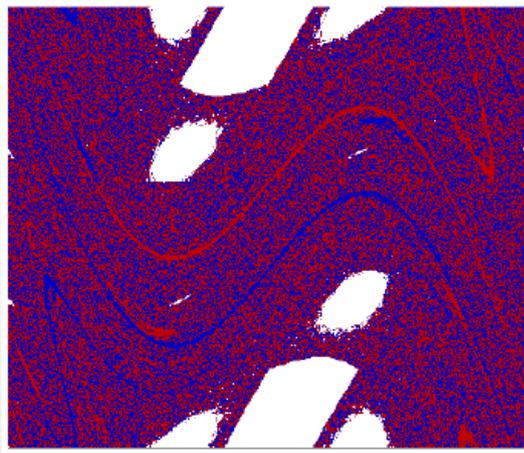
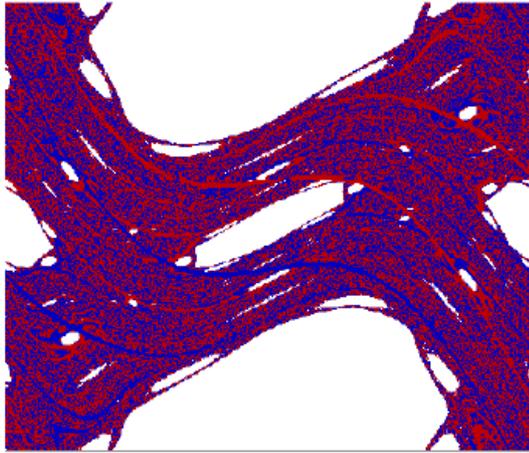
- Variaciones in S_b
- Presencia de islas KAM

Régimen hiperbólico

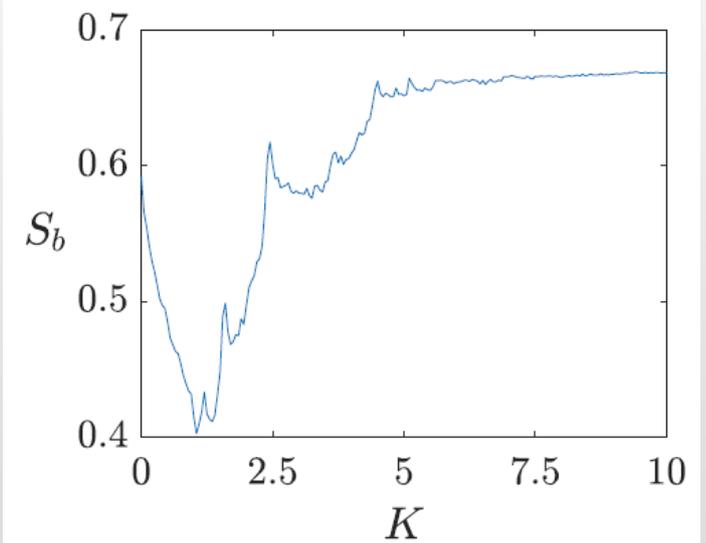
- Decrecimiento monótono
- Ausencia de islas KAM



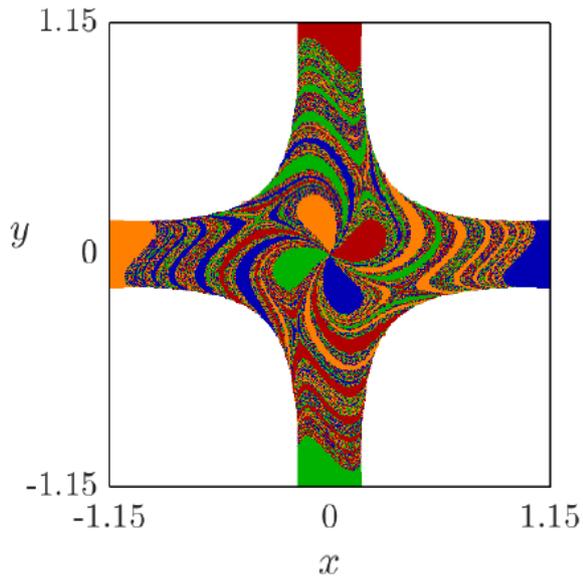
Aplicación estándar con escapes



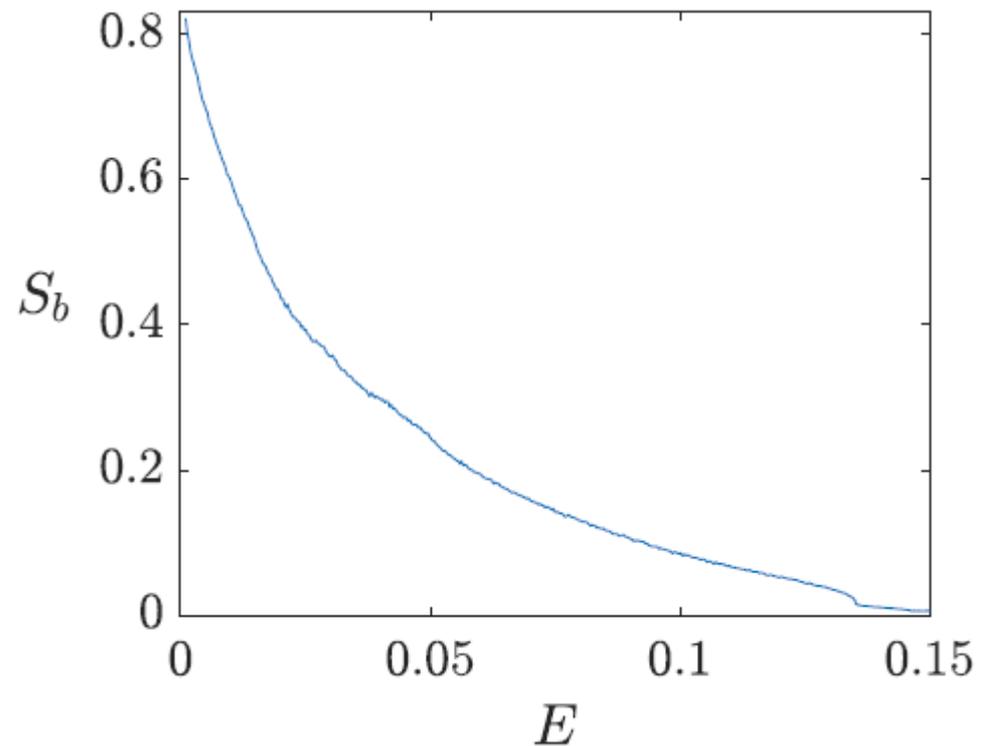
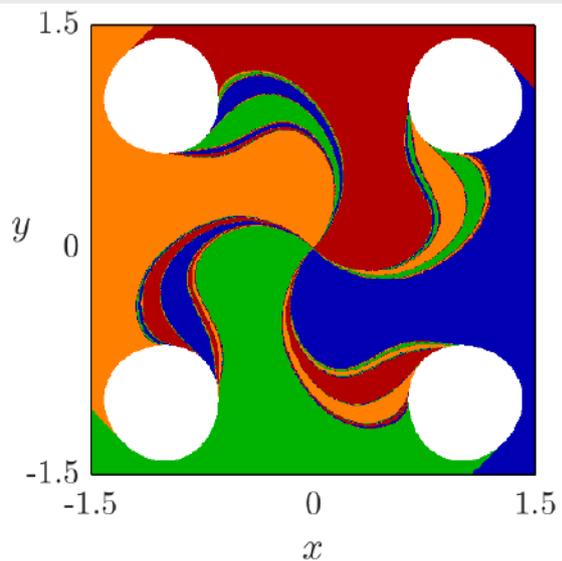
$$\begin{aligned}\theta_{n+1} &= \theta_n + J_{n+1} \pmod{2\pi}, \\ J_{n+1} &= J_n + K \sin \theta_n,\end{aligned}$$

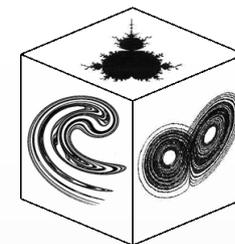


Potencial de cuatro colinas



$$\mathcal{H} = \frac{1}{2}(\dot{x}^2 + \dot{y}^2) + x^2 y^2 e^{-(x^2 + y^2)}$$

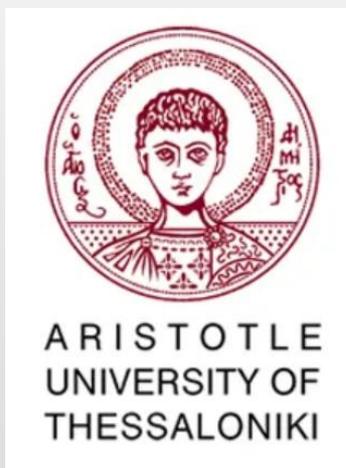




GRACIAS



Alexandre
R. Nieto



Euaggelos
E. Zotos



Jesús
M. Seoane



Miguel Ángel
F. Sanjuán