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*A non-separable locally integrable Hamiltonian system*

A mechanical Hamiltonian on  $\mathbf{T}^2 \times \mathbf{R}^2$  is said to be "separable" if in some coordinate system  $(q, p)$  it has the form

$$H(q, p) = \frac{1}{2}|p|^2 + V_1(q_1) + V_2(q_2).$$

Clearly such an Hamiltonian is globally Liouville-integrable. I will show that there exists an analytic, non-separable, mechanical Hamiltonian which is only locally integrable. Precisely I will show that  $H$  is integrable on an open subset  $\mathcal{U}$  of the energy surface  $\mathcal{S} := \{H = 1/2\}$ , whereas on  $\mathcal{S} \setminus \mathcal{U}$  it exhibits chaotic behavior. This is a joint work with V. Kaloshin