

Project:

Synchronization of Oscillators and Traveling Waves in Flies and Embryos (SYNCHRO)

Supported by: **Danish Council for Independent Research**

Description: This project aims at performing research on the interface between physics and biology. The main objective is to understand the synchronization of oscillating wings in a "Black Soldier" fly (see figure below) and the patterning of somites in mouse embryos. The effort is devoted to develop theoretical models based on physical principle in order to describe and understand the experimental findings of our collaborators at NCBS in Bangalore and at EMBL in Heidelberg. The effects of synchronization is basically related to the difference between rational and irrational numbers. One therefore often obtains an 'Arnold tongue' diagram as shown in the figure below. A vital part of the project is the recruitment and research training at PhD level. If the project is granted, the successful candidate will conduct several longer stays in NCBS, Bangalore and Heidelberg.

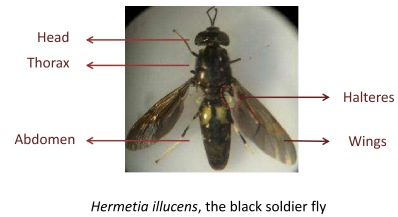
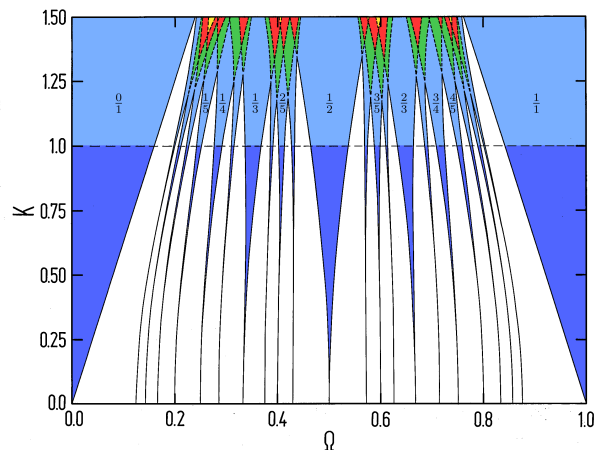


Figure 1: Left: Arnold tongue diagram of mode-locking for a system with two coupled frequencies. The broken line at $K = 1$ shows the onset of chaotic behavior. Above this line, chaos is possible (indicated by a change in the blue color); below it there is only quasiperiodic and locked behavior [?, ?]. Right: *Hermetia illucens*, the Black Soldier fly. In collaboration with NCBS Bangalore, we study synchronization between the wings and the halteres (indicated by the red circle).

Jobs: A Ph.D. position has been announced. The deadline has just passed and the position will be filled soon.

Publications: All publications related to this project will be published open access and will be available on this homepage.

Outreach: Communication to the public regarding the project's will be mediated by the NBI communication office.