



Propuesta de Trabajo Fin de Máster
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Máster en Métodos Computacionales en Ciencias

Project Nº 10

Título: Active particles within flexible cells

Departamento/ Laboratorio

Departamento de Física y Matemática Aplicada, Facultad de Ciencias

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Resumen

Active particles –such as swimming bacteria or self-propelled colloids– lead to spontaneous formation of collective arrangements that determine the dynamics of the ensemble. In recent years, the study of these active systems has attracted the attention of researchers from many different fields, including biologists, physicists and engineers. As a first step, most of the existing works have focused in simplified scenarios where, for example, the interaction among the particles and the walls is avoided or minimized. Nevertheless, it is well known that such interactions may be crucial on determining the collectivity emerging properties.

In this Master's project, we propose an experimental study of a system composed by macroscopic self-propelled particles (*hexbugs*, as shown in the figure) when confined by means of flexible walls within a cell (that will initially have circular shape). The evolution of the cell shape will be studied as a function of several parameters, such as the number of hexbugs, particle-particle and particle-wall interactions, and the wall properties in terms of flexibility



Spontaneous arrangements emerging for two hexbugs (left) and six hexbugs (right) in a 15 cm diameter cell made of a paper ribbon.