**Abstract**

Endocytosis is a highly complex mechanism which the cell uses not only to take up nutrients but also in cell-cell communication. After the endocytosis process is complete, the internalized cargo undergoes a series of dynamics processes like fission, fusion and degradation, which defines the endocytic pathway. In this work, our aim is to analyze some of these processes from a physicist's point of view. In the first part of our work, we focus on a specific type of endocytosis which is called receptor mediated endocytosis. In this process, the cargo which is to be endocytosed is coated with ligands and these ligands bind to specific receptors on the cell membrane. This binding releases chemical energy which is required to overcome the cost of bending the elastic membrane. It is possible to write down a free energy for this process and show the importance of the size of the cargo in the endocytosis process. We are trying to understand the role of interactions, either via the cell membrane or direct interactions between cargo particles, in the endocytosis process. In the second part of our work, we consider several such cargo as they are internalized and their subsequent dynamics. Here, we do simulation of these cargo particles. In our model we have rates of the different events like endocytosis, exocytosis, fission, fusion, degradation etc. We do Brownian dynamics and our particles are point particles. All the different events that we mentioned about are included as reactions with specific rates. Here our goal is to understand the importance of each of these rates in the trafficking process as well as the distribution of cargo in the endosomal compartments