Modeling project: Chromosome distances

Physics of Complex Systems M2 – Biophysics

The spatial conformations adopted by the chromosomes inside eukaryotic nuclei are the result of both thermal agitation and structural features, such as anchoring points between the chromosome and the surface of the nucleus. Fig. 1 presents two statistical measures of these conformations, in a case where anchorings are relatively unimportant (left) an in another where they matter (right).



Figure 1: Statistical information about chromosome conformation. *Left:* physical distance between two fluorescently labelled loci (*i.e.*, points of the DNA polymer) on human chromosome 4 as a function of genomic distance (*i.e.*, number of base pairs separating the two points). The physical distance is measured in terms of the average squared distance between the two labels. *Right:* Distribution of distances between two fluorescent tags on the yeast chromosome III, one of which is placed in the proximity of the centromere (*i.e.*, the place where the two sister chromatids of a chromosome are bound together and with the outside). These two regions are separated by approximately 100kbp in genomic distance.