# The genome in the nucleus: Snaky, soft and well organized

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The DNA in a human cell is ~2 meters long. Although there are no definite structures that maintain the order in the nucleus, the genome is well organized, though dynamic. What are the mechanisms that organizes the DNA in the nucleus?

Dynamic methods in live cells are ideal for studying the genome organization, which is a soft-matter structure that have no definite structure. We currently used a whole spectrum of dynamic methods in live cells that will be briefly described.

We used single particle tracking (SPT) and continuous photobleacing (CP) that are adequate for live-cell imaging. The data is analyzed according to diffusion analysis methods that we developed. In normal cells, all the sites in the genome exhibit anomalous diffusion (viscoelastic) where <r with a power law of ~0.3-0.5 and the diffusion was found to belong to the family of fractional Brownian motion anomalous diffusion.

We identified a protein, lamin A, which provides the elasticity to the genome. Removal of lamin A drastically changes the diffusion type from slow anomalous diffusion to fast and normal diffusion. We suggest a rather simple mechanism that explains the organization maintenance of the chromosomal territories and is strongly supported by the whole set of our dynamic data.