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Elucidating chromosome dynamics in vivo by trajectory analyses and Brownian dynamics simulations

To decipher the mechanisms linking chromatin dynamics and the control of transcription, we combine high-throughput in vivo imaging of the whole nucleus and Brownian dynamics simulations. We compare the chromatin mean squared displacement obtained using our high resolution diffusing mapping on human mammary tumor cells, to the one measured on numerical simulations of chromatin with RNA polymerases acting on it. We show that RNA polymerase activity leads to the measure of a drift velocity of the tagged genes. Furthermore we study the chromatin dynamics in the different phases of the cell cycle and show that it is slowing down in the G2 phase, i.e. the growing phase after the DNA replication.

Authors: M. LE FLOCH, Erwan (LPT); BYSTRICKY, Kerstin (CBI); Mme COSTES, Léa (CBI-MCD, LPT); MANGHI, Manoel (Université de Toulouse - Laboratoire de Physique Théorique); REY-MILLET, Martin

Orateur: MANGHI, Manoel (Université de Toulouse - Laboratoire de Physique Théorique)