**Glassy dynamics distinguishes chromosome organization across organisms**

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Recent experiments showing scaling of the intrachromosomal contact probability, P (s) ∼ s−1 with the genomic distance s, are interpreted to mean a self-similar fractal-like chromosome organization. However, scaling of P(s) varies across organisms, requiring an explanation. We illustrate that dynamical arrest in a highly confined space as a discriminating marker for genome organization, by modeling chromosome inside a nucleus as a self-avoiding homopolymer confined to a sphere of varying sizes. Brownian dynamics simulations show that the chain dynamics slows down as the polymer volume fraction (φ) inside the confinement approaches a critical value φc. Using finite size scaling analysis, we determine φ∞c ≈ 0.44 for a sufficiently long polymer (N ≫ 1). Our study shows that the onset of glassy dynamics is the reason for the formation of segregated organization in human chromosomes (N ≈ 3×109, φ > φ∞c ), whereas chromosomes of budding yeast (N ≈ 1.2×107, φ < φ∞c ) are equilibrated with no clear signature of such organization.