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Spatial organization of chromatin domains and compartments in single chromosomes SIYUAN WANG, JUN-HAN SU, Harvard University, BRIAN BELIVEAU, Harvard Medical School, BOGDAN BINTU, JEFFREY MOFFITT, Harvard University, CHAO-TING WU, Harvard Medical School, XIAOWEI ZHUANG, Harvard University — The spatial organization of chromatin critically affects genome function. Recent chromosome-conformation-capture studies have revealed topologically associating domains (TADs) as a conserved feature of chromatin organization, but how TADs are spatially organized in individual chromosomes remains unknown. Here, we developed an imaging method for mapping the spatial positions of numerous genomic regions along individual chromosomes and traced the positions of TADs in human interphase autosomes and X chromosomes. We observed that chromosome folding deviates from the ideal fractal-globule model at large length scales and that TADs are largely organized into two compartments spatially arranged in a polarized manner in individual chromosomes. Active and inactive X chromosomes adopt different folding and compartmentalization configurations. These results suggest that the spatial organization of chromatin domains can change in response to regulation.

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