Polymer Models of Interphase Chromosomes\textsuperscript{1} JOSHUA MARTIN, JANÉ KONDEV, Martin A. Fisher School of Physics, DEBRA BRESSEN, JAMES HABER, Rosenstiel Center & Dept. of Bio., Brandeis Univ., Waltham MA 02454 — Experiments during interphase, the growth phase of the cell cycle in eukaryotic cells, have shown that parts of chromosomes are tethered to the nuclear periphery\cite{1}. Using a simple polymer model of interphase chromosomes that includes tethering, we compute the probability distribution for the distance between two marked points on the chromosome. These calculations are inspired by recent experiments with two or more fluorescent markers placed along the chromosome\cite{2}. We demonstrate how experiments of this kind, in conjunction with simple polymer models, can be used to systematically dissect the spatial organization of interphase chromosomes in the nucleus of living cells. This comparison of theory with experiments has lead to the conclusion that the structure of chromosome III in yeast is consistent with a 10nm-fiber model of chromatin.

\cite{1}Wallace F. Marshall. Current Biology, 12, 2002.
\cite{2} Kerstin Bystricky, Patrick Heun, Lutz Gehlen, Jörg Langowski and Susan M. Gasser. PNAS, 101(47) 2004

\textsuperscript{1}This work is supported by NSF DMR-0403997. JK is a Cotrell Scholar of the Research Corporation.

Joshua Martin
Martin A. Fisher School of Physics, Brandeis Univ., Waltham MA 02454

Date submitted: 29 Nov 2005