Abstract Submitted
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The metaphase and anaphase dynamics is dominated by the physical and mechanical properties of both microtubules and chromatin LUCA GRISA, MARIA KILFOIL, University of Massachusetts, Amherst — One of the most interesting problems in biophysics involves the physical separation of chromosomes and the mechanical properties of both microtubules (MT's) and chromatin. This process involves the polymers MT's and chromatin, each of which has unique physical properties that have been determined extensively in vitro. Of further interest for physicists is the out-of-equilibrium nature of this process involving several force generators from motor proteins and MT depolymerization. We follow the dynamics of spindle pole bodies and centromeres of yeast cells during mitosis in three-dimensions at high spatial resolution. Using this novel approach, we are able to observe spindle oscillations during metaphase, and the three-dimensional dynamics of spindle elongation and chromosome separation during anaphase. With these data, we can separate the dynamics caused by MT depolymerization from those caused by the motors. This allows us to determine the depolymerization rate of the kinetochore MT's in vivo. Furthermore, we determine the temporal profile of the chromatin extension during anaphase we combine with the known force-extension curve of chromatin in vitro, to infer the expected force-velocity curve of the collective motors in vivo, which has never been measured in vivo or in vitro.

Luca Grisa
University of Massachusetts, Amherst

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