Biophysics of mitotic spindle positioning in *C. elegans* embryos

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The spindle is positioned asymmetrically during the first mitotic division in *C. elegans*. We are investigating how different forces coordinated to move the spindle, and if these forces are generated from interactions with the cytoplasm, the cortex, or a combination of both. For this purpose, we constructed a laser ablation system capable of cutting complex patterns with high spatial and temporal precision, and are applying it to quantitatively perturb spindle movements. We are also using fluorescent nanodiamonds to track cytoplasmic fluid flow as the spindle moves. Our results suggest that dynamic net pulling forces from the cortex drive key aspects of spindle motions, including the asymmetric positioning and the transverse oscillating behaviors. Further combining with mathematical simulation, we hope to provide a quantitative, integrated understanding of spindle positioning.