Effect of excluded volume on the force-extension of wormlike chains in slit confinement XIAOLAN LI, KEVIN DORFMAN, University of Minnesota - Twin cities — We will present a quantitative phase diagram for the stretching of a wormlike chain confined in a slit with excluded volume interactions. Using pruned-enriched Rosenbluth method (PERM) simulations, we demonstrate the existence of a "confined Pincus" regime in slit confinement. This regime is similar to the Pincus regime in free solution, where excluded volume effects are sensible. The lower bound for the confined Pincus regime in the force-contour length plane and the dependence of the extension with force and slit size are in agreement with scaling theory. The upper bound of the confined Pincus regime depends on the confinement strength; it ends in strong confinement when the Pincus blobs do not have excluded volume, while it ends in weak confinement when the Pincus blobs do not fit in the slit. We also show the existence of a free-solution Pincus regime in weak confinement that exists before ideal chain behavior sets in under strong forces. We will discuss the implication of our results on the analysis of experiments on the "tug-of-war" stretching of DNA partially confined to a slit.

Xiaolan Li
University of Minnesota - Twin cities