

Supporting Information

Stretching and compression of DNA by external forces under nanochannel confinement

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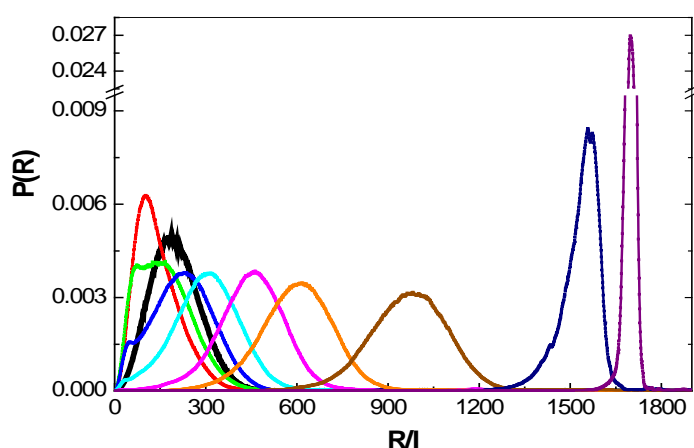


Figure S1. The distribution functions $P(R)$ of DNA confined in channels of the reduced width D/P (from the right side): 0.68 (purple), 0.97 (navy), 1.54 (brown), 2.25 (orange), 2.96 (magenta), 4.39 (cyan), 5.82 (blue), 8.67 (green), 14.38 (red) and of bulk DNA (black, highlighted) plotted as a function of the end-to-end distance R .

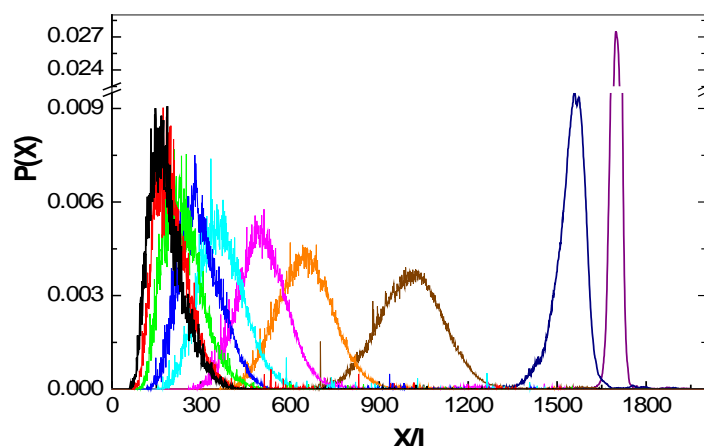


Figure S2. The distribution functions $P(X)$ of DNA confined in channels of the reduced width D/P (from the right side): 0.68 (purple), 0.97 (navy), 1.54 (brown), 2.25 (orange), 2.96 (magenta), 4.39 (cyan), 5.82 (blue), 8.67 (green), 14.38 (red) and of bulk DNA (black, highlighted) plotted as a function of the chain span X .

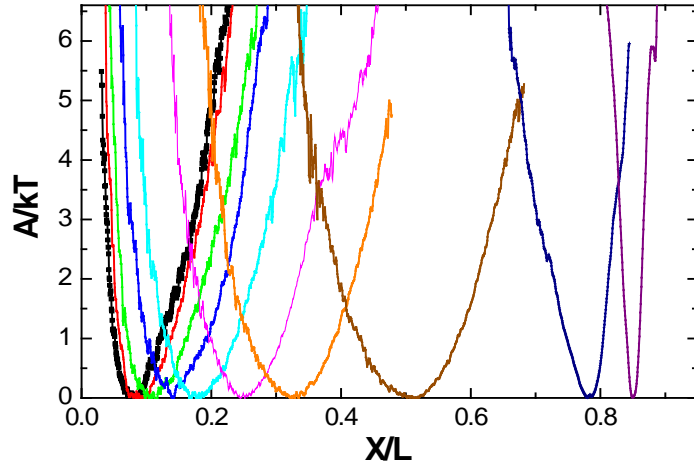


Figure S3. The free energy profiles $A(X)$ of DNA molecules confined in the channels of the reduced width D/P (from the right side) : 0.68 (purple), 0.97 (navy) – the Odijk regime; 1.54 (brown), 2.25 (orange), 2.96 (magenta), 4.39 (cyan) – the T-zone; 5.82 (blue), 8.67 (green), 14.38 (red) – the de Gennes regime, and of bulk DNA (black, highlighted), plotted as a function of the fractional extension X/L .

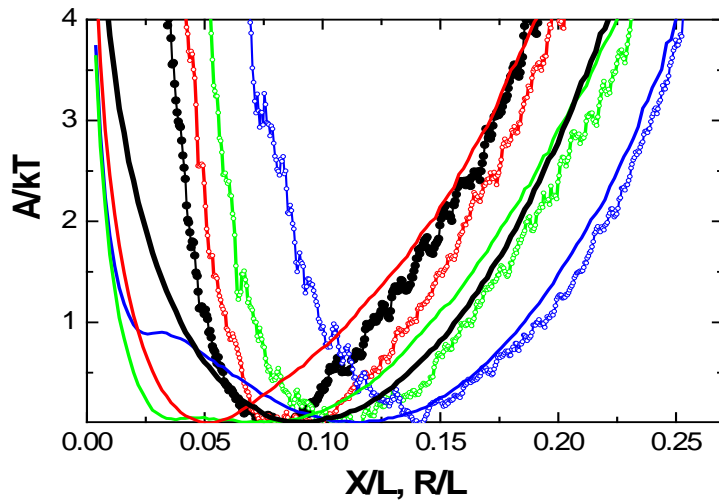


Figure S4. The free energy profiles $A(R)$ and $A(X)$ in the region of the fractional extension R/L and X/L less than 0.25 for DNA molecules in the channels of the reduced width D/P : 5.82 (blue), 8.67 (green), 14.38 (red) in the de Gennes regime, and for bulk DNA (black, highlighted).

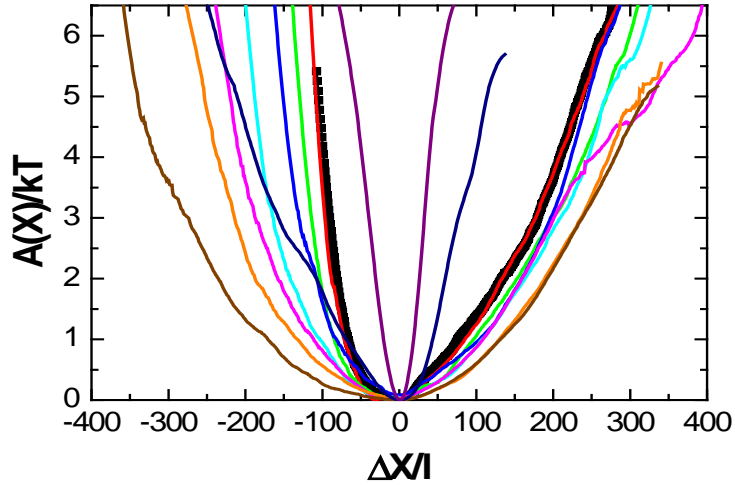


Figure S5. The elastic free energy profiles $A(\Delta X)$ of confined DNA molecules and of the bulk DNA. The color code for the channels width D/P : 0.68 (purple), 0.97 (navy) – the Odijk regime; 1.54 (brown), 2.25 (orange), 2.96 (magenta), 4.39 (cyan) – the T-zone; 5.82 (blue), 8.67 (green), 14.38 (red) – the de Gennes regime, and for bulk DNA (black, highlighted).

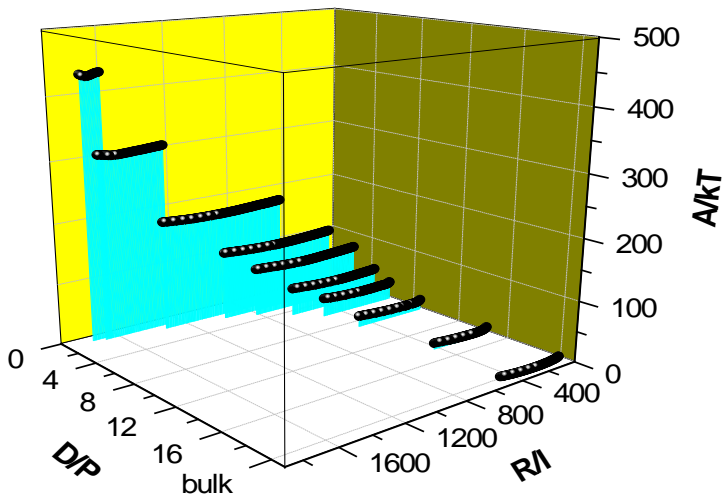


Figure S6. Visualization of the interplay of the confinement (A_D/kT) and deformation ($A(R)/kT$) free energy terms for DNA in channels and in bulk in the full ranges of the channel size D/P and the fractional extension R/L . The bulk data at the D/P axis are placed out of scale.