



Universiteit  
Leiden  
The Netherlands

## **Structural changes in single chromatin fibers induced by tension and torsion**

Meng, H.

### **Citation**

Meng, H. (2014, October 9). *Structural changes in single chromatin fibers induced by tension and torsion*. *Casimir PhD Series*. Retrieved from <https://hdl.handle.net/1887/29020>

Version: Not Applicable (or Unknown)

License: [Leiden University Non-exclusive license](#)

Downloaded from: <https://hdl.handle.net/1887/29020>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/29020> holds various files of this Leiden University dissertation

**Author:** Meng, He

**Title:** Structural changes in single chromatin fibers induced by tension and torsion

**Issue Date:** 2014-10-09

# Propositions

Accompanying the thesis

“Structural changes in single chromatin fibers induced by tension and torsion”

by He Meng

1. In negatively supercoiled DNA, plectonemes coexist with twisted DNA and melting bubbles.  
[Chapter 2 of this thesis]
2. The rupture of a chromatin fiber by force can be characterized by four nucleosome conformations: a folded, a singly wrapped, an extended and a fully unwrapped nucleosome.  
[Chapter 3 of this thesis]
3. The anisotropic response of a torsionally constrained chromatin fiber to changes in twist reflects its left-handed chirality.  
[Chapter 4 of this thesis]
4. Positive supercoiling controls chromatin fiber folding and unfolding at forces larger than 2.5 pN.  
[Chapter 4 of this thesis]
5. Surprisingly, the number of plectonemes in a topological domain depends not on the size of the domain, but only on the ionic strength and applied force.  
[Van Loenhout et al. *Science* **338**: 94 (2012)]  
[Emanuel et al. *Phys. Rev. E* **88**: 1539 (2013)]
6. Since torque can not facilitate nucleosome unwrapping below 1 pN, the chiral change of a left-handed nucleosome into a right-handed one below 1 pN as reported by Bancaud et al. should not happen.  
[Sheinin et al. *Nature communications* **4**: 2579 (2013)]  
[Bancaud et al. *Molecular Cell* **27**: 135 (2007)]
7. In view of the fact that DNA in a nucleosome is only wrapped on histone cores, it is surprising that removal of the histone tails increases the DNA unwrapping rate.  
[Bintu et al. *Cell* **151**: 738 (2012)]
8. The fact that active genes are negatively supercoiled, whereas silent genomic regions appear positively supercoiled, provides a beautiful example of the role of topology in Nature.  
[Dixon et al. *Nature* **485**: 376 (2012)]  
[Naughton et al. *Nat. Struct. Mol. Biol.* **20**: 387 (2013)]
9. Unsuccessful scientific experiments should be published, rather than remain buried in lab journals.
10. “Big Data” cannot replace human judgement.  
[Inspired by the essay “Eight Problems With Big Data” on *The New York Times* (2014)]

Leiden, 9 October, 2014