

## Lijie Ding

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### Education

Ph.D. (Physics), Brown University 2017-2022  
 Research interests: Soft Matter, Computational Physics  
 Advisor: Robert A. Pelcovits and Thomas R. Powers

B.Sc. (Applied Physics), University of Science and Technology of China 2013-2017  
 Thesis: Irreversible Monte Carlo Algorithms  
 Advisor: Youjin Deng

### Experience

**Monte Carlo simulation of chiral fluid membrane** 2018-present

- Designed theoretical *quantitative models* for the colloidal membrane.
- Implemented off-lattice dynamical triangulation simulation from scratch using *C++*.
- Expanded and implemented Lebwohl-Lasher model to the off-lattice setting.
- Carried out simulation on *high performance computing cluster* using *Slurm*, written controlling script using *bash script*.
- Analyzed and visualized data using *Python*, present results to people with different backgrounds.

**Controlled DNA Brownian motion using electrokinetic noise** 2017-2018

- Proposed and tested the *stochastic process* modeling hypothesis using overdamped Langevin equation for the DNA molecule in the microfluidic channel.
- Designed and implemented *image processing* program for fluorescent DNA molecule tracking and selection, and analyzed *time-series* data using *Python* and *OpenCV*.

**Irreversible Monte Carlo algorithms** 2015-2017

- Designed state-of-the-art irreversible Monte Carlo *algorithm* that breaks the detailed balance condition using lifting technique and implemented it using *C++*.
- Carried out *efficiency benchmarking* using Sokal's auto-windowing method, and analyzed data using *Python*, up to 14,100% improvement were achieved.

### Skills

**Programming:** C++, Python, Mathematica, Matlab, Shell, HTML&CSS.

**Software&Package:** Blender, Git, OpenFoam, Numpy, Scipy, OpenCV, Matplotlib.

**Technical:** Complex systems modeling, Statistical algorithms development, Data analysis and visualization.

### Publications

- Lijie Ding, Robert A. Pelcovits, and Thomas R. Powers. Deformation and orientational order of chiral membranes with free edges. *Soft Matter*, 17:6580–6588, 2021
- Lijie Ding, Robert A Pelcovits, and Thomas R Powers. Shapes of fluid membranes with chiral edges. *Physical Review E*, 102(3):032608, 2020
- Shayan Lameh, Lijie Ding, and Derek Stein. Controlled Amplification of DNA Brownian Motion Using Electrokinetic Noise. *Physical Review Applied*, 14(5):054042, 2020
- Eren Metin Elçi, Jens Grimm, Lijie Ding, Abraham Nasrawi, Timothy M Garoni, and Youjin Deng. Lifted worm algorithm for the Ising model. *Physical Review E*, 97(4):042126, 2018