Matthew Leighton

Curriculum Vitae

Education

2020–Present **M.Sc. in Physics**, *Simon Fraser University*, Burnaby, Canada.

2016–2020 **B.Sc. Honours in Physics and Mathematics**, *Dalhousie University*, Halifax, Canada.

- **Honours Thesis:** *Modelling the Formation of Cross-Linked Collagen Fibrils*, supervised by Prof. Andrew Rutenberg.
- Member of the Varsity Track Team (2016-2018)
- Choral Scholar with the University of King's College Chapel Choir (2016-2020)

2019 **Exchange Program, Mathematics and Statistics**, *Chalmers University of Technology*, Göteborg, Sweden.

Experience

Research Experience

2020–Present **Graduate Researcher**, *Sivak Group*, Simon Fraser University.
Working under the supervision of professor David Sivak, analyzing biological molecular machine systems using the theory of nonequilibrium statistical mechanics. Projects include a quantitative investigation into the cooperative behaviour of molecular motors in cellular transport systems.

2018–2020 **Undergraduate Researcher**, *Rutenberg Group*, Dalhousie University.
Worked with professor Andrew Rutenberg on various research projects in theoretical biophysics using computational and mathematical methods. Projects included modelling stochastic effects in the process of host cell invation by *S. Typhimurium* bacteria, developing a theoretical model for the thermodynamics of *in vivo* Collagen fibril growth, and studying the mechanics of double-twist liquid crystal elastomer systems under deformation.

Other Experience

2017–2018 **Business Analyst**, *Inetco Systems LTD*, Vancouver, Canada.
Responsibilities included:

- Financial modelling and analysis,
- Managing marketing campaigns, and
- Communicating product requirements to the software development team.

Started as a summer co-op student, and stayed on as a part time consultant over the next year.

Vancouver – BC – Canada
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Summer 2018 **Science Outreach**, *Dalhousie University*, Halifax, Canada.
- Led interactive physics experiment demonstrations as part of the Discovery Days outreach program for elementary and high school students.

Summer 2015,2016 **Bicycle Instructor**, *Pedalheads*, Vancouver, Canada.
- Taught children aged 4-13 beginner to advanced biking skills.

Volunteer Coach.
- Head coach for a Vancouver Hawks youth field hockey team (Spring 2015/16/17)
- Assistant coach for Kitsilano Secondary School's junior ice hockey team (2015-2016)

Publications and Manuscripts

M.P. Leighton, L. Kreplak, and A.D. Rutenberg, "Nonequilibrium Growth and Twist of Cross-Linked Collagen Fibrils,", *Soft Matter*, **17**:1415, 2021.

M.P. Leighton, L. Kreplak, and A.D. Rutenberg, "Chiral Phase-Coexistence in Compressed Double-Twist Elastomers,", *Soft Matter*, in press, 2021.

Submitted

M.P. Leighton, A.D. Rutenberg, and L. Kreplak, "D-Band Strain Underestimates Collagen Fibril Strain", 2021.

Selected Talks and Posters

Talks

November 2020 **Structural Phase Transitions in Double-Twist Elastomers**, *Collagen Cafe II*.

July 2020 **Nonequilibrium Growth of Cross-Linked Collagen Fibrils**, *Collagen Cafe I*.

June 2020 **Elastomeric Properties of Double-Twist Collagen Fibrils**, *Soft Matter Canada Symposium*.

March 2020 **Modelling Cross-Linking in Collagen Fibrils**, *APS March Meeting (via DSOFT Virtual Meeting)*.

January 2020 **Coarse-Grained Structure of Double-Twist Liquid Crystals**, *Atlantic Undergraduate Physics Conference*.

November 2019 **Modelling Cross-Linking in Collagen Fibrils**, *Canadian undergraduate Physics Conference*.

August 2018 **Stochastic Modelling of Cellular *Salmonella* Infection**, *Dalhousie Bioblast Symposium*.

Posters

February 2021 **Performance Trade-offs in Cooperative Intracellular Transport**, *SFU Physics Department Poster Session*.

Awards

2020–2021 **NSERC CGS-M**, *Simon Fraser University*.
2020–2021 **BC Graduate Scholarship**, *Simon Fraser University*.
2020–2021 **Dean's Graduate Fellowship**, *Simon Fraser University*.
2020 **NSERC USRA**, *Dalhousie University*.
2018 **NSERC USRA**, *Dalhousie University*.
2016–2020 **Chancellor's Scholarship**, *Dalhousie University*.
2016–2020 **Helen Roby Choral Scholarship**, *University of King's College*.
2017–2018 **USports Academic All-Canadian**, *Dalhousie University*.
2016–2017 **USports Academic All-Canadian**, *Dalhousie University*.
2017 **Archibald Physics Prize**, *Dalhousie University*.
2016–2020 **Dean's List**, *Dalhousie University*.

Miscellaneous Qualifications

Grade 8 Piano and Advanced Music Theory, *Royal Conservatory of Music*.

DELF B2, *French language Certification*.

CSIA Level 1 Ski Instructor, *Canadian Ski Instructors Alliance*.

AST 1 Avalanche Skills, *Avalanche Canada*.

Emergency First Aid, CPR-C, and Bronze Cross, *Canadian Lifesaving Society*.

Cansail 4, *Sail Canada*.

Languages and Technical Skills

- **Languages:** English (Native), French (Fluent)
- Extensive experience with scientific programming and numerical optimization in Python
- Experienced in the use of Compute Canada computing clusters
- Working knowledge of MATLAB, Mathematica, HTML, R, and C/C++