Xiaojia J. Xu • Curriculum Vitae

2301 Vanderbilt Pl
PMB 357668
Nashville, TN 37235, USA
Phone: +1(615)668-8368

Email: xiaojia.j.xu@vanderbilt.edu
Website: xj-xu.github.io
Born November 15, 1996 in Shenzhen, China
Chinese citizen, Canadian permanent resident

Research interests

Biophysics & condensed matter
I am particularly interested in studying **active matter** systems that exhibit emergent phenomena, such as collective behavior and self-organization. Examples of these systems include, but is not limited to: wound healing in Drosophila epithelia and flocking of starlings.

Education

2015 - 2019 **B.A. in Physics** with Honors, Vanderbilt University (Expected)
- Thesis: "Web-based application of the Cellular Force Inference Toolkit (CellFIT)"
- Thesis advisor: Professor M. Shane Hutson
- Physics GPA: 3.9/4.0
- Minors: Scientific Computing; Earth and Environmental Science.

2011 - 2015 **GCE A-Levels**, Shenzhen College of International Education
- A-Levels in Physics, Mathematics, Biology and Geography

Publications & talks

Journal articles

2018 Daniel Kidd, **Xiaojia Xu**, Cody Covington, Kazuyuki Watanabe, Kalman Varga, "Simulation of laser-induced rectification in a nanoscale vacuum-tube diode", *Journal of Applied Physics* 123, 054501. DOI: 10.1063/1.5019259

Talks

2019 American Physical Society March Meeting, Boston, *Contributed talk* (abstract submitted)
Web-based application of the Cellular Force Inference Toolkit (CellFIT)

2018 American Physical Society March Meeting, Los Angeles, *Contributed talk*
Simulation of Laser-Induced Rectification in a Nano-scale Diode Model

2017 Vanderbilt Undergraduate Research Fair, *Poster presentation*

2017 Vanderbilt Summer Science Academy 15th Annual Research Symposium, *Poster presentation*

2017 Vanderbilt Physics & Astronomy Summer Symposium, *Oral presentation*

Research experience

July 2018 - now **Biophotonics Lab**, Vanderbilt University.
Advisor: Professor M. Shane Hutson.
• Currently working on a web-based application (front-end and back-end) of the Cellular Force Inference Toolkit (CellFIT) that allows users to access the software from a browser. The updated version would include improved error handling and the implementation of

additional functionality for reading and processing image stacks. The goal is to apply the web-based CellFIT to time-resolved image stacks of wound healing in Drosophila epithelia and see the spatial and temporal variations in cellular forces as the wounds close.

Aug - Dec 2017 **Center for Molecular and Atomic Studies at Surfaces**, Vanderbilt University.
Advisor: Professor Norman Tolk.
• I reviewed and evaluated several ab-initio packages to calculate energy defect density dependence of photoelastic coefficients and dielectric tensor in semiconductors. I was trained and assisted with ultrafast pump-probe experiments that were focused on generation and detection of coherent acoustic phonons in GaAs and GaP involving setup alignment, data acquisition and data analysis using Python.

Apr - Aug 2017 **Computational Condensed Matter Physics Group**, Vanderbilt University.
Advisor: Professor Kalman Varga.
• I worked on time-dependent density functional theory simulations in Fortran 90 of a nanoscale vacuum-tube diode. Recent interest in electron photo-emission from metal nanotips, motivated by improved ultrafast laser-guidance of electrons, has inspired research pointing back in the direction of vacuum transport as a path towards achieving such higher speeds. We have computationally demonstrated laser-induced rectification by simulating the effects of increased electron emission due to near-field enhancement within a periodic jellium system with geometrical asymmetry.

Jan 2016 – Apr 2017 **Atmospheric Physics Group**, Vanderbilt University.
Advisor: Professor Ralf Bennartz.
• I learned to develop software using IDL for processing data from a Multi-Angle Snowflake Camera (MASC), which is capable of collecting 10^3 image triplets (as there are 3 cameras) during a snowfall event. The goal was to go through the images and create a particle size distribution. I also helped to set up a sun photometer as part of the NASA Aerosol Robotic Network and attempt to gather data on atmospheric chemical composition.

Other academic experiences

June 2018 Summer School at the Center for the Physics of Biological Functions, Princeton University
• Physics of Life Summer School

June - Aug 2013 Summer College, Stanford University
• Introductory physics sequence with lab (PHYSICS 21S, 23S, 25S)

Honours, awards & funding

Applied for or results pending:

2018 Canada Graduate Scholarships, Natural Sciences and Engineering Research Council ($17,500)

Received:

2018 Vanderbilt Undergraduate Conference Travel Award ($1000)

2017 Summer undergraduate research funding received from Professor Kalman Varga's National Science Foundation grants OISE 1261117 and PHY 1314463 ($5000)

2015-18 Dean's List, College of Arts and Science, Vanderbilt University

2016-17 Undergraduate research funding received from Professor Ralf Bennartz ($2900)

2012 Bronze Award, United Kingdom Mathematics Trust Senior Mathematical Challenge

2012 Highest score in year, Cambridge IGCSE Geography

2010 1^{st} Place in year, top 5% in the world, University of Waterloo Gauss Mathematics Contest

Teaching & tutoring

Aug 2017 - now **Vanderbilt Tutoring Services**
Physics and mathematics tutor
Classes tutored:
• Physics for the Life Sciences (PHYS 1501, 1502)
• General Physics (PHYS 1601, 1602)
• Principles of Physics (PHYS 1911)
• Single-variable and Multivariable Calculus (MATH 1300, 1301, 2300)
• Methods of Linear Algebra (MATH 2410)
• Methods of Ordinary Differential Equations (MATH 2420)

Aug 2017 - Aug 2018 **Department of Physics and Astronomy, Vanderbilt University**
Grader and help desk tutor for:
• Physics for the Life Sciences (PHYS 1501, 1502)
• General Physics (PHYS 1601, 1602)

May - Aug 2018 Varsity Tutors
Calculus and programming tutor

Jan - Apr 2016 Vanderbilt Student Volunteers for Science
7th grade geology teacher

Skills

• Proficiency in Python, Bash and LaTeX. Familiarity with Fortran 90, C, Java, HTML, MATLAB, IDL, Mathematica.
• Familiarity with parallel computing APIs: OpenMP, MPI, CUDA.
• Experience with computing clusters (e.g. ACCRE, UNIX cluster environment).
• Experience with setting up high-speed cameras, sun photometers and ultrafast pump-probe experiments.
• Languages: Fluency in English and Mandarin Chinese; elementary proficiency in Canadian French.

Standardized test scores

2018 **GRE General**
Verbal: 162/170 (91st percentile)
Quantitative: 166/170 (91st percentile)
Analytical writing: 5.0/6.0 (92nd percentile)

2014 **SAT General and Subject**
Critical reading: 750/800 (98th percentile)
Mathematics: 800/800 (99th percentile)
Physics: 800/800 (89th percentile)

Sports

2017 - now Vanderbilt Climbing Club
• Captain of the climbing team competing in the USA Climbing Collegiate Series
• Founder and president of the club

2015 - 2016 Shenzhen Longboard downhill skateboarding team rider
• 4th place at the 2016 Sanzhoutian Cup (biggest race in Southern China at the time)

2011-2015 SCIE (high school)
• Varsity soccer team captain

Employment

June 2016 – now Vanderbilt Outdoor Recreation Center
• Climbing wall staff • Equipment specialist • Trip coordinator

Societies

• American Physical Society, undergraduate member
• Sigma Pi Sigma Physics Honor Society, Vanderbilt Chapter, member
• Vanderbilt Society of Physics Students, Webmaster

Community Service

2018 Worked with the American Physical Society Office of Government Affairs on an advocacy initiative concerning the PROSPER Act.
2016-2017 Alpha Phi Omega National Service Fraternity, Vanderbilt Chapter member
2016 Vanderbilt Alternative Spring Break (ASB) service trip participant

...
Last updated: December 6, 2018 • Typeset in XeLaTeX
http://xj-xu.github.io