

Seth W. MUSSER

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STATEMENT OF PURPOSE

My goal as a physicist is to probe the role that topology plays in fundamental physics phenomena from the quantum Hall effect to vortex dynamics in a superfluid. As such, in graduate school I plan to study the role of topology in hard condensed matter. I am also passionate about helping students to think about physics pictorially and to appreciate and take advantage of symmetry in their work.

EDUCATION

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| 2018 - Present | PhD student in PHYSICS
Massachusetts Institute of Technology: Cambridge, MA |
| 2017-2018 | MASt (MSc equivalent) with Distinction in APPLIED MATHEMATICS
The University of Cambridge: Cambridge, UK |
| 2013-2017 | BA with Honors in PHYSICS
BS with Honors in MATHEMATICS
The University of Chicago: Chicago, IL
CUMULATIVE GPA: 3.97/4.00 |

HONORS AND AWARDS

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| 2019-2022 | NSF Graduate Fellow |
| 2017-2018 | Churchill Scholar |
| Summer 2017 | Enrico Fermi Institute Undergraduate Research Award |
| Summer 2017 | James Franck Institute Undergraduate Research Award |
| May 2017 | John H Lewis Prize for best graduating physics student |
| Summer 2016 | Selove Prize for Summer Research |
| May 2016 | Phi Beta Kappa (3 rd year) |
| March 2016 | Goldwater Scholar |

PUBLICATIONS AND PRESENTATIONS

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| In preparation with Prof. Irvine: | "Tunable Nucleation of Superfluid Vortices from Hydrofoil" |
| Talk for ChuSOARS: | "Vortex Nucleation in Superfluids" |
| Paper for 2016 REU: | "Weyl's Law on Riemannian Manifolds" |
| Paper for 2015 REU: | "From Hamiltonian Systems to Poisson Geometry" |
| Talk for 2015 REU: | "Poisson Geometry with Applications to the Hamiltonian Formulation of Inviscid Fluid Mechanics" |
| Paper for 2014 REU: | "Weakly Nonlinear Oscillations with Analytic Forcing" |

RESEARCH EXPERIENCE

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| APR. 2016 - PRESENT | University of Chicago Department of Physics
Superfluids Researcher
PI: Professor William Irvine <ul style="list-style-type: none">Built from scratch simulation of dragging hydrofoil through a 2D superfluid governed by Gross-Pitaevskii equation (GPE); later independently ported to GPUUsing simulation to understand the role circulation plays in vortex nucleation, and similarities between superfluid and ideal fluid flowWorking on a paper detailing controlled nucleation of vortices in a superfluid, using a hydrofoil potential |
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SUMMER 2016, '15, '14	University of Chicago Department of Mathematics REU Student MENTORS: Sean Howe and Yun Cheng, Clark Butler, and Ben Seeger <ul style="list-style-type: none"> • 2016 - Studied Riemannian geometry and the spectrum of the geometric Laplacian to understand Weyl's law and DeWitt expansion • 2015 - Studied Poisson manifolds to develop a rigorous background for understanding the Hamiltonian formulation of inviscid fluid mechanics • 2014 - Studied the failure of regular perturbation theory to address the weakly nonlinear oscillator and demonstrated two-timing as an alternative approach
JAN. 2015 - MAR. 2016	University of Chicago Department of Mathematics Mathematical Fluid Dynamics Researcher MENTOR: Professor Norman Lebovitz <ul style="list-style-type: none"> • Studied turbulence through seminal papers and texts • Studied the application of Hamiltonian formulation of inviscid fluid mechanics to stability results for Riemann ellipsoids • Numerically and analytically evaluated various methods to probe stability within this context

WORK EXPERIENCE

SEP. 2014 - JUNE 2017	University of Chicago Department of Mathematics Junior Tutor for MATH 13000s <ul style="list-style-type: none"> • Lead 80-minute tutorial sessions twice a week to solidify students' understanding • Gave quizzes and other formative assessments, and graded homework
AUG. 2014 - OCT. 2014	University of Chicago College Programming Office Orientation Leader <ul style="list-style-type: none"> • Helped set up and organize events for the Class of 2018's Orientation Week • Led a group of 30 members of the Class of 2018 in discussions about drugs, alcohol, sexuality, race, and privilege at the college • Conveyed the college's expectations for behavior while facilitating discussions

PROGRAMMING LANGUAGES

Fluent: \LaTeX , python, Mathematica, FORTRAN, OpenCL
 Some Experience: CUDA, C, LabVIEW