

Abdulai Gassama

Physics Ph.D. Student

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EDUCATION

- Brown University** Providence, RI, USA
• *Doctor of Philosophy – Physics*
GPA: 4.0/4.0
Focus in 2D Topological Defects in Disordered Systems
Co-PIs: Prof. Xinsheng "Sean" Ling and Prof. J. Michael Kosterlitz (Nobel 2016)
- Clark University** Worcester, MA, USA
• *Bachelor of Arts (Honors) – Physics*
Minor - Actuarial and Financial Mathematics
Thesis: Pattern Formation in Multicomponent Lipid Membranes

RESEARCH EXPERIENCES

- Brown University** Hybrid
• *Condensed Matter Physics Research Assistant* May 2022 - Present
 - Numerical Studies of 1D Random-Field $1/r^2$ Ising model:** Studying 1D random-field Ising model with $1/r^2$ interactions using Monte Carlo. Answering the question of whether systems with quenched disorder or frustration that prevents the emergence of long-range order have a real phase transition. Supervised by Prof. X.S. Ling, Prof. J.K. Kosterlitz, and Prof. R.A. Pelcovits.
 - Thermally Activated Dynamics in 2D Colloidal Glasses and Crystals:** Using video microscopy and Monte Carlo simulations to investigate the physical mechanism of a two-step 2D colloidal glass transition of rods. NSF-funded. Supervised by Prof. X.S. Ling and Prof. J.K. Kosterlitz.
- Syros Pharmaceuticals** Hybrid
• *Computational Chemist (Full-time · Summer Position)* June 2022 – August 2022
 - Structure and Ligand-based virtual screening:** Support building and performing molecular dynamics simulations of chosen protein/DNA-ligand complexes via Maestro.
- Clark University** Hybrid
• *High Energy Physics Research Fellowship* May 2021 - August 2021
 - Intensive Paid Summer Research:** Recipient of LEEP Fellowship Award. I received this for research on graphical manifolds.
 - Monograph:** Written a 52-page monograph explaining calculations for asymptotically flat manifolds and asymptotically hyperbolic manifolds, titled "Positive Mass In All Dimensions." Supervised by Prof. Aghil Alaei, Harvard CMSA associate.
 - Impact:** Worked towards a graphical solution for the Horowitz-Myers conjecture.

ONGOING & REFEREED PUBLICATIONS

- Phase Transitions in 1D Dislocation Chains:** J.Eick, A.Gassama, O.Tower, N.Sharma, Prof. X.S. Ling, Prof. J.K. Kosterlitz, and Prof. R.A. Pelcovits—(*In Preparation*)
- Review of A Short Course in Computational Geometry and Topology** by Herbert Edelsbrunner. **SIGACT News** 52(4) :11-14 (2021): A.Gassama, F.Green

HONORS & AWARDS

- LEEP Fellowship Award** - Clark University, May 2021
A highly selective grant that helps reward recipients pursue unpaid, problem-based projects or research during the summer months. Typically given to those that have already conducted research for over a year.

COURSEWORK

Quantum Computing · Solid State Physics · General Relativity · Quantum Field Theory · Quantum Many-Body Physics · Applied AI & ML · Advanced Statistical Mechanics · Differential Geometry · Experimental Physics

TECHNICAL BACKGROUND

- Advanced Experiments:** Electrochemistry, Colloids, Topological Data Analysis
- Programming:** Python, Java, Julia, Matlab
- Software:** Maestro (Schrödinger)
- Statistics:** Very knowledgeable in Totally Asymmetric Exclusion Processes, and Finite State Projection Analyses, Data Fitting, MCMC and Metropolis Hastings Analysis, Stochastic Simulations, Model Optimization
- ML Libraries:** Knowledgeable in Pytorch, TensorFlow
- Languages:** English (Native), Japanese (Proficient), Korean (Conversational)