Amel Derras-Chouk

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Current Position

The City College of New York — New York, NY
Postdoctoral Researcher — Sept. 2022 - Present

- Combine remote sensing and physical models to quantify cumulus convection, estimating uncertain atmospheric variables like vertical velocity and mass flux

Education

The Graduate Center, City University of New York — New York, NY
PhD, Physics — Sept. 2022
Dissertation: *Stability of two-dimensional magnetic skyrmions*
Advisors: Prof. Eugene M. Chudnovsky and Prof. Dmitry A. Garanin

Tufts University, School of Engineering — Medford, MA
Bachelor of Science: Double major in Mechanical Engineering and Physics — May 2015

Research Experience

Lehman College — Bronx, NY
Graduate Researcher — Jun. 2017 – Aug. 2022

- Developed classical and quantum theories to model two-dimensional spin systems
- Parallelized thousands of computations using multithreading and distributed computing
- Analyzed program outputs by visualizing results and performing statistical tests
- Presented results to audiences of scientific backgrounds at national conferences

NASA Climate Change Research Initiative — New York, NY
Graduate Student Research Assistant — Oct. 2021 – Aug. 2022

- Automated retrieval and analysis of over 40 years of Landsat optical data using Python
- Proposed a methodology based on literature to measure flooding using Sentinel-1 data
- Integrated data from NOAA, USGS, ASF, and citizen scientists into a cohesive workflow
- Tailored presentations to heterogeneous audiences of experts and local teachers

Tufts Superconductivity Lab — Medford, MA
Lab Assistant — May 2013 – Sept. 2014

- Measured the conductivity of superconducting wire under tension and pressure
- Simulated the wire in experimental conditions using ANSYS to pinpoint locations of stress
- Soldered electronics and drafted parts to send to machinists

Manuscripts in Preparation

- A. Derras-Chouk, Z. J. Luo, and T. Matsui. Assessing a Satellite-Based Estimate of Convective Mass Flux Using Large Eddy Simulations.

- A. Derras-Chouk and Z. J. Luo. An Analytical Model for the Relationship between Vertical Velocity and Condensation Rate in Convective Clouds.
- A. Derras-Chouk, Z. J. Luo, and T. Matsui. Assessing a Satellite-Based Method for Identifying Convective Cores and Estimating Convective Mass Flux.

Publications

- A. Derras-Chouk and Z. J. Luo. A Geostationary Satellite-Based Estimate of Convective Mass Flux: Methodology, Evaluation, and Global Surveys. *Under Review*
- C. Braneon, L. Ortiz, D. Bader, N. Devineni, P. Orton, B. Rosenzweig, T. McPhearson, L. Smalls-Mantey, V. Gornitz, T. Mayo, S. Kadam, H. Sheerazi, E. Glenn, L. Yoon, A. Derras-Chouk, J. Towers, R. Leichenko, D. Balk, P. Marcotullio and R. Horton, NYC Climate Risk Information 2022: Observations and Projections, *Annals of the New York Academy of Sciences.* (Accepted for publication)
- A. Derras-Chouk, E. M. Chudnovsky, and D. A. Garanin. Dynamics of the collapse of a ferromagnetic skyrmion in a centrosymmetric lattice. *Physical Review B **105**,* 134432 (2022).
- A. Derras-Chouk, E. M. Chudnovsky, and D. A. Garanin. Quantum States of a Skyrmion in a Two-Dimensional Antiferromagnet. *Physical Review B* **103**, 224423-(8) (2021).
- A. Derras-Chouk and E. M. Chudnovsky, Skyrmions Near Defects. *Journal of Physics: Condensed Matter* **33**, 195802-(10) (2021).
- A. Derras-Chouk, E. M. Chudnovsky, and D. A. Garanin. Thermal Collapse of a Magnetic Skyrmion. *Journal of Applied Physics* **126**, 083901 (2019). *(Featured Selection)*
- A. Derras-Chouk, E. M. Chudnovsky, and D. A. Garanin. Quantum Collapse of a Magnetic Skyrmion. *Phys. Rev. B* **98**, 024423 (2018). *(Editor's Suggestion)*
- A. Derras-Chouk, E. M. Chudnovsky, D. A. Garanin, and R. Jaafar. Graphene Cantilever under Casimir Force. *Journal of Physics D* **51**, 19. (2018).

Selected Presentations

- A. Derras-Chouk and Z. J. Luo. "A Satellite-Based Approach to Estimating Convective Mass Flux and Revisiting the Hot Tower Hypothesis." Poster presentation delivered at AGU, San Francisco, CA, Dec. 12, 2023
- A. Derras-Chouk, E. M. Chudnovsky, and D. A. Garanin. "Quantum Collapse of a Magnetic Skyrmion." Oral presentation delivered at APS March Meeting, Boston, MA, Mar. 8, 2019
- A. Derras-Chouk, E. M. Chudnovsky, D. A. Garanin, and R. Jaafar. "Graphene Cantilever under Casimir Force." Oral presentation delivered at APS March Meeting, Los Angeles, CA, Mar. 8, 2018

Teaching Experience

Lehman College — The Bronx, NY
Adjunct Lecturer — Aug. 2017 – May 2021

- Taught physics labs to over 50 students a semester, emphasizing experimental design
- Assessed student understanding through written assignments and problem-solving sessions
- Redesigned seven experiments for remote learning and incorporated student feedback

Success Academy Charter Schools — The Bronx, NY
Computer Science Lead Teacher — Aug. 2015 – May 2016

- Engaged students in a progressive pedagogical approach to computer science
- Developed both professional and teaching skills in monthly network-wide trainings

Tufts Office of Physics and Astronomy — Medford, MA
Teaching Assistant — Sept. 2014 – May 2015

- Tested and set up electronic equipment for undergraduates in biweekly lab sessions
- Enforced lab safety standards and replaced faulty, unsafe components when necessary

Additional Experience

EnergyWatch — New York, NY
Software Development Intern — May 2016 – Aug. 2016

- Built a quality assurance program to test functionality of hundreds of links on company site
- Sought feedback from senior software developers to optimize program design in Java
- Integrated the testing software with an alert system that notified developers of issues

Tufts Technology Services — Medford, MA
Customer Support Representative — May 2013 – Jan. 2015

- Troubleshoot computer issues with both faculty and students in person and remotely
- Acted as the first line of support in all hardware issued at the computer lab and library

Community Service

Word Up Community Bookshop — New York, NY
Collective Member & Donation Analyst — Sept. 2017 – Jan. 2024

- Streamline collection of donation data from multiple sources by automating with Python
- Summarize recent donation activity to present to other members of the collective

Honors and Awards

Graduate Center Dissertation Fellowship — 2020-2021
Physics Tithe Fellowship — 2018-2022

Skills

Programming languages: Julia, Python, C++, Java
Software: Mathematica, Matlab, LabView, SolidWorks, AutoCAD