

Farid Qamar

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EDUCATION AND CERTIFICATION

- 2020 – Present **PhD Engineering and Public Policy**
Projected Completion in May 2023
University of Delaware | *Newark DE, USA*
Current GPA – 4.0
Dissertation – Developing a novel solution to monitor air quality using ground-based hyperspectral remote sensing of vegetation in urban environments.
- 2019 – 2020 **Master of Science in Data Science**
(transferred to PhD)
University of Delaware | *Newark DE, USA*
GPA – 4.0
- 2016 **Data Science Certification**
Johns Hopkins University *through Coursera*
- 2012 – 2014 **Master of Science in Physics & Astrophysics**
Queen’s University | *Kingston ON, Canada*
Thesis – Environmental Effects on Interacting Galaxy Pairs in the Sloan Digital Sky Survey
- 2008 – 2012 **Honors Bachelor of Science in Physics, Summa Cum Laude**
McMaster University | *Hamilton ON, Canada*
Major – Physics with Astrophysics specialization
Thesis – Radiative Transfer in the TreeSPH code GASOLINE for Simulating Planetary Formation

CURRENT RESEARCH POSITION

- 2019 – Present **Graduate Student Researcher - Exploring the Use of Urban Vegetation as Indicators for Air Quality and Associated Policy Considerations**
Principal Investigator: Dr. Gregory Dobler, Urban Observatory, University of Delaware
Funding provided by a James S. McDonnell Foundation Complex Systems Scholar Award
- Investigating the potential utilization of ground-based hyperspectral remote sensing to continuously monitor the air quality (AQ) across large swaths of urban areas with high spatial and temporal granularity using a single instrument. The proposal to achieve this is by using the inherent ability of trees and plants to react to variations in concentrations of chemicals in the atmosphere and the ability to detect such physiological changes using ground-based remote imaging.
- Examining whether the implementation of spatially granular neighborhood-level monitoring policies in cities results in improvements in the distribution of AQ that would not have been gained by relying solely on readings from the sparse federally implemented EPA monitoring network. Additionally, investigating the potential factors and variables that are driving the diffusion process of hyperlocal air quality monitoring policies and programs in the US between various cities.

PAST RESEARCH & WORKING POSITIONS

- 2020 - 2021 **Graduate Research Assistant** | University of Delaware
Principal Investigator: Dr. Gregory Dobler, Urban Observatory, University of Delaware
Funding provided by a National Institutes of Health (NIH) DE-CTR ACCL grant
Assisted in the development of the Delaware Hospitalization and Recovery Metrics Analysis (DHARMA) software for use by the State of Delaware to produce forecasts of future COVID-19 hospitalizations in the state.
Formulated and developed the ability to incorporate subpopulation characteristics into the DHARMA base code in order to better simulate the spread of COVID-19 through the population. The subpopulations can be divided into age groups, localities, or any significant separator with common characteristics that include social distancing, mask utilization, and comorbidities.
Designed and developed a public-facing webapp that allows the State of Delaware and other resource-limited States and Countries to simulate future COVID-19 hospitalizations, as well as other potential pandemics, with the flexibility to input a large number of parameters and potential scenarios.
- 2016 – 2019 **Project Manager** | Ontario Ministry of Natural Resources and Forestry
Led a team and managed all aspects of a project initiated to comply with new policy to modernize the management of the commercial fishing and tree harvesting operations across the province.
The project involved creating the system and processes to gather harvest data for the province, analyzing the data to calculate the market prices by geographical zones, calculating the royalty owed by each license holder, and using the data to assign quotas to maintain the sustainability of lake fishing and timber harvesting in the province.
Designed and developed a prototype application using the Ethereum Blockchain that collects commercial harvest data and analyzes it to calculate quotas and royalties in real time to create a more efficient and secure system to assure the sustainability of fish in Ontario.
- 2015 – 2016 **Data Scientist and Operations Manager** | Security and Technology Alliance Group
Operated all aspects of a startup I.T. company that offers services in data science, cybersecurity, cloud computing, and document management.
Designed and executed a project to create a prototype digital alarm system for underground mining operations. The system worked by gathering mine integrity data from sensors, analyzes the data using Python, and uses the results to alert miners in the event of imminent mine collapse.
- 2014 – 2015 **Graduate Research Assistant** | SNOLAB, Queen's University
Graduate Research Assistant in Particle and Nuclear Astrophysics
Performed research using Monte Carlo sensitivity studies to find a method for statistical signal extraction for the SNO+ experiment that eliminates background noise.
Performed various chemical analyses on materials used in the SNO+ detector to account for the metal impurities and enhance our understanding of the background noise.
- 2012 – 2014 **Graduate Research Assistant** | Queen's University and Trent University
Graduate Research Assistant in Observational Astrophysics

Using the Sloan Digital Sky Survey, I collected the raw data on ~500,000 galaxies, and developed a statistical method for defining galaxy pairs with appropriate controls for comparison. I then performed statistical analysis on the properties of galaxy pairs to extract large-scale effects on the galaxies from interactions depending on the density of their environments.

2010 – 2011 **Undergraduate Research Assistant** | McMaster University

Performed research in Computational Astrophysics to implement and test radiative transfer in the TreeSPH code Gasoline to add the ability to simulate planetary formation to the code.

Performed statistical research to investigate the effect of environment and redshift on the properties of interacting galaxy pairs from the CNOC2 sky survey.

Assisted in performing research on the use of analogues for cores and stars while simulating collapsing and turbulent molecular clouds.

PUBLICATIONS

Articles Published in Refereed Journals

1. **Qamar, F.**; Sharma, M.S.; Dobler G. (2022). The Impacts of Air Quality on Vegetation Health in Dense Urban Environments: A Ground-based Hyperspectral Imaging Approach. *Remote Sensing*, 14 (16): 3854. DOI: <https://doi.org/10.3390/rs14163854>
2. **Qamar, F.**; Dobler, G. (2020). Pixel-Wise Classification of High-Resolution Ground-Based Urban Hyperspectral Images with Convolutional Neural Networks. *Remote Sensing*, 12 (16): 2540. DOI: <https://doi.org/10.3390/rs12162540>
3. **Qamar, F.**; Gomez-Fonseca, A.; Dobler, G. (2021). The Effects of Atmospheric Modeling Covariance on Ground-Based Hyperspectral Measurements of Surface Reflectance. *11th IEEE GRSS Workshop on Hyperspectral Imaging and Signal Processing: Evolution in Remote Sensing (WHISPERS)*, pp. 1-5. DOI: <https://doi.org/10.1109/WHISPERS52202.2021.9483972>
4. Patton, D.; **Qamar, F.**; et al. (2016). Galaxy pairs in the Sloan Digital Sky Survey – XI. A new method for measuring the influence of the closest companion out to wide separations. *Monthly Notices of the Royal Astronomical Society*, 461 (3): 2589–2604. DOI: <https://doi.org/10.1093/mnras/stw1494>
5. Wadsley, J.; Reid, M.; **Qamar, F.**; Sills, A.; Petitclerc, N. (2010). Analogues of Cores and Stars in Simulated Molecular Clouds. *Proceedings of the International Astronomical Union*, 6(S270), 129-132. DOI: <https://doi.org/10.1017/S1743921311000287>

In Progress

1. **Qamar, F.**; Pierce, A.; Dobler, G. (in review). The Policy Diffusion of Neighborhood-Level Hyperlocal Air Quality Monitoring Among Cities in the US. *Cities*.
2. Dobler, G. ; Bianco, F.; Best, E.; Clifford, J.; Ibrahim, M.; **Qamar, F.**, et al. (in progress). Delaware Hospitalization and Recovery Metrics Analysis (DHARMA): a Hybrid Compartmentalized/Agent-based Model of Disease Spread.

Theses and Dissertations

1. **Qamar, F.** (2014). *Environmental Effects on Interacting Galaxy Pairs in the Sloan Digital Sky Survey*. Unpublished master's thesis, Queen's University, Kingston, ON Canada.

2. **Qamar, F.** (2012). *Radiative Transfer in Simulating Planetary Formation*. Unpublished honors bachelor's thesis, McMaster University, Hamilton, ON Canada

CONFERENCE PRESENTATIONS AND POSTERS

- 2021 Effects of Atmospheric Modeling Covariance on Ground-Based Hyperspectral Measurements of Reflectance. Presentation at the 11th IEEE-WHISPERS, online conference.
- 2021 Remote Imaging and Artificial Intelligence: Seeing Through a Computer's Eyes. Presentation at Art in Science, University of Delaware.
- 2021 Effects of Atmospheric Modeling Covariance on Ground-Based Hyperspectral Measurements of Reflectance. Poster and Presentation at the DARWIN Computing Symposium, Newark, DE.
- 2020 Classification of High-Resolution Ground-Based Urban Hyperspectral Images with Convolutional Neural Networks. Poster at the Delaware Environmental Institute. Poster and Presentation at the DARWIN Computing Symposium, Newark, DE.
- 2020 Classification of High-Resolution Ground-Based Urban Hyperspectral Images with Convolutional Neural Networks. Poster at the Delaware Environmental Institute. Poster at the Delaware Environmental Institute (DENIN) Research Symposium, Newark, DE.
- 2019 Segmentation of Ground-based Hyperspectral Images to Identify Vegetation in Urban Environments. Poster and Presentation at the Data Science Institute Symposium, Newark, DE.
- 2018 An Ethereum Blockchain-Based Prototype for Commercial Fishing Quota Management in the Province of Ontario. Led a team to develop a working prototype and presented the results at the 1st Annual Ontario Public Service 3-day Hackathon. Toronto, ON Canada.
- 2014 Environmental Effects on Interacting Galaxy Pairs in the Sloan Digital Sky Survey. Presentation at the Canadian Astronomical Society Annual Conference, Quebec City, QC Canada.
- 2014 Environmental Effects on Interacting Galaxy Pairs in the Sloan Digital Sky Survey. Master's thesis defense at Queen's University, Kingston, ON Canada.
- 2012 Radiative Transfer in Simulating Planetary Formation. Honors bachelor's thesis defense at McMaster University, Hamilton, ON Canada.
- 2011 Group and Field Interacting Close Pairs in the CNOC2 Survey. Presentation at the Canadian Undergraduate Physics Conference, Saskatoon, SK Canada.

TEACHING EXPERIENCE

- 2022 **University Instructor**, University of Delaware & Lincoln University
Course: PHYS167/GEOG167/SPPA167/MATH115, Foundations of Data Science for Everyone
Developed and delivered the curriculum, lectures, assignment, and tests for an undergraduate-level course on the Foundations of Data Science targeted at students from groups that are underrepresented in STEM fields.
- 2022 **Teaching Assistant and Guest Lecturer**, University of Delaware, Newark, DE USA
Course: SPPA 722, Machine Learning for Public Policy
Developed and presented two 1.5-hour lectures (3-hour total) to introduce Support Vector Machines and their use in developing a model that predicts the sentiment of social media posts
- 2021 **Guest Lecturer**, University of Delaware, Newark, DE USA
Course: CIEG 865, Civil Engineering Seminar

- Developed and presented one 30-minute lecture to discuss neighborhood-level air quality monitoring in urban areas in the United States
- 2015 **Teaching Assistant**, Queen’s University, Kingston, ON Canada
Course: CURR 351, Introduction to Teaching Physics
- 2014 **Teaching Assistant**, Trent University, Peterborough, ON Canada
Course: PHYS 3510H, Astrobiology: Life in the Universe
Course: PHYS 4520H, Astrophysics: Galaxies & Cosmology
- 2013 **Teaching Assistant**, Trent University, Peterborough, ON Canada
Course: PHYS 1510H & PHYS 1520H: Introductory Astronomy I & II
- 2012 **Teaching Assistant**, Queen’s University, Kingston, ON Canada
Course: PHYS 117, Introductory Physics

HONORS & AWARDS

- 2022 **Government Services Scholarship** | American Society for Photogrammetry and Remote Sensing (ASPRS)
- 2021 **DARWIN Symposium Best Poster Award** | Delaware Advanced Research Workforce and Innovation Network, University of Delaware
- 2021 **Fellowship Finalist** | George W. Laird Fellowship, University of Delaware
- 2019 **DSI Symposium Best Poster Award** | Data Science Institute, University of Delaware
- 2018 **Project Excellence Award** | Ontario Public Service
- 2018 **Appreciation in Motion Award** | Ontario Ministry of Natural Resources and Forestry
- 2015 **R.S. McLaughlin Fellowship** | Queen's University
- 2013 **Slavin Research Scholarship** | Trent University
- 2012 **Honors B.Sc. Summa Cum Laude** | McMaster University
- 2009, 2010, 2012 **Dean’s Honor List** | McMaster University
- 2010 **Dr. Harry Lyman Hooker Scholarship** | McMaster University
- 2008 **McMaster University Honor Award** | McMaster University
- 2006 **HiMCM Regional Outstanding Award** | International High School Mathematical Contest in Modelling
- 2006 – 2008 **Full Scholarship** | United World College Costa Rica

LEADERSHIP & PROFESSIONAL SERVICE

- 2022 – Present Elected Senator, Graduate Student Government, University of Delaware
- 2022 Data scientist and remote sensing consultant, The Convergence Hub for the Exploration of Space Science (CHESS), National Science Foundation
- 2021 – Present Data Science Institute Student Fellow, University of Delaware
- 2021 Data Science Institute Symposium Organizer, University of Delaware

2021 Peer reviewer for the Remote Sensing Journal

2020 – 2021 Supervisor and mentor to upper-level undergraduate physics students to develop their undergraduate research theses.

2015 – 2017 Peterborough High School Regional Science Fair judge, Trent University

2013 – 2014 Astronomy observing nights coordinator, Trent University

2013 – 2014 Physics Help Desk coordinator, Trent University

2013 Supervisor and mentor to an undergraduate astrophysics student during a summer research project at the University of Victoria

2011 – 2012 Fourth Year Student Representative in the Physics Society at McMaster University

2010 – 2012 Physics Help Desk coordinator, McMaster University