# Denis Mulumba

*Resume*

## Education

2022 - present **Computing Ph.D. with emphasis in Computational Mathematics, Science and Engineering** , *Boise State University*, Boise, Idaho.

### Ph.D. Research

Topic one: **A three dimensional Immersed interface method for solving the Generalized Poisson equation**.

Topic two: **Tailoring Surface Topology Maps for Enhanced Catalysis Simulations** .

Topic three: **Transition Metal Dichalcogenides with Double Vacancies as Catalysts for Efficient $CO_2$ Reduction to Methanol**.

2020 - 2021 **Masters' in Mathematical Sciences**, *African Institute for Mathematical Sciences*, Remera, Rwanda.

### Masters' Project

Title: **The pseudo heat equation as an estimate of the convolution integral**.

2015 - 2019 **Bachelors of Science with Education in Physics and Mathematics**, *Makerere University*, Kampala, Uganda.

## Work Experience

Aug. 2022 – Present **Computing Ph.D. Researcher in Applied Mathematics and Materials Science, Boise State University**, *Boise, Idaho, USA*.

Conducting interdisciplinary research at the intersection of numerical methods and computational materials science, with a focus on solving partial differential equations and modeling catalytic processes for $CO_2$ reduction.

- Developed high-accuracy solvers for elliptic PDEs on irregular domains using the Immersed Interface Method (IIM).
- Designed $3D$ numerical schemes for anisotropic jump conditions using spherical harmonics and radial basis function (RBF) interpolation.
- Simulated catalytic surfaces and reaction pathways for $CO_2$ conversion to methanol using density functional theory (DFT) and machine learning models.
- Analyzed catalyst stability, reaction energetics, and selectivity using Python-based computational chemistry tools.
- Integrated HPC workflows for large-scale simulations across math and material science domains.
- Presented research findings at national conferences and contributed to peer-reviewed publications.
- Mentored undergraduate researchers in applied math, numerical simulation, and computational chemistry.

Oct. 2021 - Feb 2022 **VoxCroft Analytics Technology, Information and Internet**, *South Africa*.

Collecting language related data and quality assurance

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July 2017. - Mar. 2020 **High school Mathematics and Physics teacher, Universal High school Kisaasi**, *Kampala,Uganda*.
Teacher or math and physics, Assistant director of studies

## Certifications, Achievements and Awards

April 2025 CASCADE Rain travel award 2025

Aug. 2024 Best Oral Presenter at the symposium "Accelerating Catalytic Advancements Through the Precision of High-Throughput Experiments and Calculations" at the ACSFALL 2024 conference

2022 Events manager for Society for Industrial and Applied Mathematics Boise State Chapter.

2020 - 2021 MasterCard Foundation Scholarship awarded a fully funded Scholarship to study at African Institute for Mathematical Sciences (AIMS).

2018 Bachelors of Science with education in Physics and math

## Relevant Skills

OS Windows, Linux, macOS

Softwares Microsoft Office, LibreOffice, Tensorflow, Pytorch LaTeX

Programming Python, R, MatLab, C

## Languages

Luganda Fluent (mother tongue)

English Fluent

## References

Name Prof. Oliviero Andreussi
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Name Prof. Donna Calhoun
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