

# Grace Arhin

Department of Biophysics

University of Michigan

[garhin@umich.edu](mailto:garhin@umich.edu)

<https://www.linkedin.com/in/grace-arhin-170561175/>

## EDUCATION

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### University of Michigan Ann Arbor, MI

*May 2025 (expected)*

Doctor of Philosophy, Biophysics (GPA: 4.0/4.0)

### KNUST, Kumasi, Ghana

*May 2019*

Bachelor of Science, Chemistry (GPA: 3.7/4.0)

## RESEARCH/WORK EXPERIENCE

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### Graduate Student Research Assistant

*Sep 2020 – present*

University of Michigan, Ann Arbor, MI, USA

Ph.D. Thesis: Understanding Structure and Dynamics of RNAs using NMR and Molecular modeling

Advisors: Sarah C. Keane, Ph.D. and Aaron T. Frank, Ph.D.

- Using NMR and enzymatic assays to study the effects of structural dynamics of pre-let-7f-2 maturation by Dicer enzyme
- Screening for ligands that bind a regulatory element in the human OncomiR-1 miRNA using a combination of STD-NMR and molecular modeling
- Working on developing LARMORD-Q: A machine learning predictor that reproduces QM-Derived RNA Chemical Shifts

### Structural and Computational Chemistry Intern

*Jun 2023 – Aug 2023*

Merck & Company, Rahway Inc. NJ, USA

Research project: To Enable BIONMR Study of VHL Mediated Protein Degradation:

Backbone Assignments of E3 Ligase VHL-ElonC-ElonB (VCB) Complex

Mentors: Yunpeng Zhou, Ph.D. and Daniel Wyss, Ph.D.

- Isotopically labeled and purified the VCB protein complex
- Partially assigned the HSQC spectra of the VCB protein complex using HNCO, HN(CA)CO, HNCA and HN(CO)CA spectra

### Undergraduate Researcher

*Sep 2018 – May 2019*

KNUST, Kumasi, Ghana

Undergraduate Thesis: 1,3-dipolar cycloaddition reactions of norbornadiene derivatives

with C, N-disubstituted nitrones: A computational Study

Advisors: Richard Tia, Ph.D. and Evans Adei, Ph.D.

- Studied the reaction of C-Phenyl, N-methyl nitron with ester-substituted 7-isopropylideneborbornadiene derivatives (DENBD)

- Studied the effects of substituents on the reactions between DENBD N-methyl nitrones

### Summer Intern

*Jun 2018 – Aug 2018*

Ghana Standards Authority, Accra, Ghana

Job title: Quality control officer

Mentor: Ghana Power Compact Internship and Mentoring Program under the Millennium Development Authority (GCIMP)

- Run routine tests such as biochemical and chemical oxygen demand on wastewater samples
- Assessed the quality of general items such as fertilizer, household bleach and detergent
- Assessed the quality of drinking water by running routine pH, chloride, alkalinity, and total dissolved solids test

### TECHNICAL EXPERTISE

**Laboratory:** NMR Spectroscopy, UV Spectroscopy, Isothermal Titration Calorimetry, Surface Plasmon Resonance, Circular Dichroism.

**Modelling:** Machine Learning, CM-Pro-VLS, RdKit, rDock, Sci-Kit Learn, Tensorflow, CHARM, AMBER, Spartan, Gaussian, Avogadro, Chimera, Pymol.

**Programming:** C++, Python, R, Bash Scripting

**Languages:** Twi and English (fluent), Spanish and French (basic)

### PEER-REVIEWED PUBLICATIONS

Fedorova O, **Arhin G**, Pyle AM, Frank AT. In Silico Discovery of Group II Intron RNA Splicing Inhibitors. ACS Chemical Biology. 2023 Aug 21;18(9):1968-75

Moudgal N, **Arhin G**, Frank AT. Using Unassigned NMR Chemical Shifts to Model RNA Secondary Structure. The Journal of Physical Chemistry A. 2022 Apr 26;126(17):2739-45

Liu Y, Kotar A, Hodges TL, ..., **Arhin G**, ..., Johnson BA, Keane SC. A. NMR chemical shift assignments of RNA oligonucleotides to expand the RNA chemical shift database. Biomolecular NMR Assignments. 2021 Oct;15(2):479-90

Opoku E, **Arhin G**, Pipim GB, Adams AH, Tia R, Adei E. Site-, enantio- and stereo-selectivities of the 1, 3-dipolar cycloaddition reactions of oxanorbornadiene with C, N-disubstituted nitrones and dimethyl nitrilimines: a DFT mechanistic study. Theoretical Chemistry Accounts. 2020 Jan;139:1-5

**Arhin G**, Adams AH, Opoku E, Tia R, Adei E. 1, 3-Dipolar cycloaddition reactions of selected 1, 3-dipoles with 7-isopropylidenenorbornadiene and follow-up thermolytic cleavage: a computational study. *Journal of Molecular Graphics and Modelling*. 2019 Nov 1;92:267-79

### **CONFERENCES/SYMPIOSIUMS/SEMINARS**

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**Arhin G**, Keane SC. Discovery of ligands for a regulatory element in the OncomiR-1 miRNA: A combined STD-NMR and molecular modeling approach, *UM Biophysics seminar series*, Nov 2023 (oral)

**Arhin G**, Keane SC. Discovery of ligands for a regulatory element in the OncomiR-1 miRNA: A combined STD-NMR and molecular modeling approach, *Rustbelt RNA meeting*, Oct 2023 (poster)

**Arhin G**, Keane SC. Alternate conformations of pre-let-7f-2 miRNA affects Dicer cleavage efficiency, *UM Center for RNA Biomedicine's 7<sup>th</sup> Annual Symposium*, Mar 2023 (poster)

**Arhin G**, Frank AT. LAMORD-Q: A machine learning predictor that reproduces QM-derived RNA chemical shifts for structural studies, *Pfizer Biotech Connect Symposium*, Apr 2022 (oral)

**Arhin G**, Frank AT. Integrative Modelling of SARS-CoV2 SL1 RNA using NMR Chemical Shift Data and Structure Prediction, *UM Biophysics Retreat*, Oct 2021 (poster)

**Arhin G**, Tia R, Adei E. 1,3-Dipolar cycloaddition reactions of C, N-disubstituted nitrones with 7-isopropylidenenorbornadiene: A Computational Study, *Ghana science association seminar*, Apr 2019 (poster)

### **TEACHING AND MENTORING**

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#### **Laboratory Mentor**

*Sep 2023 – present*

University of Michigan, Ann Arbor, MI, USA, Department of Biophysics, Keanelab

- Mentoring a biophysics undergraduate student in laboratory skills development including experimental design and data analysis

#### **Graduate Student Instructor**

*Jan 2021 – May 2023*

University of Michigan, Ann Arbor, MI, USA, Department of Biophysics

Course directors: Sarah Veatch, Ph.D., Qiong Yang, Ph.D., and Ayalusammy Ramamorthy, Ph.D.

- Introduction to scientific programming: Held office hours to address students' programming needs and graded weekly coding assignments

- Dynamical processes in biophysics: Held office hours to address students' needs and graded weekly assignments
- Theory and methods of biophysical chemistry: graded weekly assignments

### **Teaching Assistant**

*Sep 2019 – Jul 2020*

KNUST, Kumasi, Ghana, Department of Chemistry

- Coordinated departmental weekly seminars.
- Supervised and assessed laboratory work for undergraduate Chemistry and Chemical Engineering students
- Tutored junior and senior year Chemistry students in Physical Chemistry and Computational Chemistry respectively
- Supervised Chemistry undergraduate research

### **COMMUNITY SERVICE**

Volunteer work at the Aburaso Methodist Hospital

*Jun 2016 – Aug 2016*

Volunteer work at the Komfo Anokye teaching hospital

*Jun 2017 – Aug 2017*

### **PROFESSIONAL AFFILIATIONS**

**Member**, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCChE)

**Member**, Graduate Society of Black Engineers, and Scientist (GSBES)

**Ambassador**, Millennium Development Authority (MiDA EmPowers)

**Member**, Women in Science, Engineering and Mathematics, Ghana (WiSTEM-Gh)

### **HONORS/AWARDS**

**Certificate of Honor**, 2019 Best Graduating Student for the Department of Chemistry, KNUST, Kumasi, Ghana.