

# Calvin Arter

I'm a PhD candidate at the University of North Carolina at Chapel Hill pursuing a degree in Environmental Sciences and Engineering. My dissertation focuses on determining the contribution from individual anthropogenic emission sources to regional air quality and quantifying the impacts from potential emission abatement strategies. My work utilizes a specific sensitivity analysis, the Decoupled-Direct Method (DDM), as implemented in a chemical transport model, the Community Multiscale Air Quality Model (CMAQ), to estimate the contribution of on-road vehicle and aircraft emissions to air quality conditions in the United States and the potential benefits of reducing emissions from these anthropogenic sources.

## PERSONAL DATA

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PHONE                    330 421 4610  
EMAIL                    [arterca@email.unc.edu](mailto:arterca@email.unc.edu)

## EDUCATION

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MAY 2021                Doctor of Philosophy in ENVIRONMENTAL SCIENCES AND ENGINEERING,  
University of North Carolina at Chapel Hill, Chapel Hill  
Field: Air Quality Modeling  
Thesis: "Quantifying the impact of transportation sector emissions on  
regional air quality" | Advisor: Dr. Saravanan Arunachalam and Dr.  
Marc Serre

MAY 2016                Master of Science in PHYSICS, Wake Forest University, Winston-Salem  
Field: Computational Condensed Matter Physics  
Thesis: "First-principles modeling of MOF74 for gas sequestration and  
storage applications" | Advisor: Dr. Timo Thonhauser  
Gpa: 3.4/4.0

MAY 2013                Bachelor of Science in PHYSICS, Wake Forest University, Winston-Salem  
Advisor: Dr. Greg Cook  
Gpa: 3.3/4.0

## AREAS OF SPECIALIZATION

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AIR QUALITY	Regional air quality modeling, Chemical transport modeling, Emissions modeling, Strategies aimed at transportation sector emission reductions, Sensitivity analyses, Health impacts from exposure to air pollution
PHYSICS	Computational condensed matter physics, Density Functional Theory, van der Waals density functionals, Hydrogen storage materials, Carbon capture and gas sequestration, Metal Organic Frameworks

## PUBLICATIONS

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- 2020 **Calvin Arter**, Sarav Arunachalam, *Using Higher Order Sensitivity Approaches to Assess Aircraft Emissions Impacts on O<sub>3</sub> and PM<sub>2.5</sub>*, Air Pollution Modeling and its Application XXVI, 978-3-030-22055-6 (2020). DOI: [10.1007/978-3-030-22055-6](https://doi.org/10.1007/978-3-030-22055-6)
- 2016 **C. A. Arter**, S. Zuluaga, D. Harrison, E. Welchman, and T. Thonhauser, *Fivefold increase of hydrogen uptake in MOF74 through linker decorations*, Phys. Rev. B **94**, 144105 (2016). DOI: [10.1103/PhysRevB.94.144105](https://doi.org/10.1103/PhysRevB.94.144105)
- 2016 S. Zuluaga, Erika Fuentes, Kui Tan, **C. A. Arter**, Jing Li, Yves J. Chabal, and T. Thonhauser, *Chemistry in confined spaces: reactivity of the Zn-MOF-74 channels*, J. Mater. Chem. A **4**, 13176 (2016). DOI: [10.1039/C6TA04388G](https://doi.org/10.1039/C6TA04388G)
- 2015 T. Thonhauser, S. Zuluaga, **C. A. Arter**, K. Berland, E. Schröder, and P. Hyldgaard, *Spin signature of nonlocal correlation binding in metal-organic frameworks*, Phys. Rev. Lett. **115**, 136402 (2015). DOI: [10.1103/PhysRevLett.115.136402](https://doi.org/10.1103/PhysRevLett.115.136402)
- 2014 K. Berland, **Calvin A. Arter**, V.R. Cooper, K. Lee, B.I. Lundqvist, E. Schröder, T. Thonhauser, and P. Hyldgaard, *van der Waals density functionals built upon the electron-gas tradition: Facing the challenge of competing interactions*, J. Chem. Phys. **140**, 18A539 (2014). DOI: [10.1063/1.4871731](https://doi.org/10.1063/1.4871731)
- 2013 P. Canepa, **Calvin A. Arter**, E.M. Conwill, D.H. Johnson, B.A. Shoemaker, K.Z. Soliman, and T. Thonhauser *High-throughput screening of small-molecule adsorption in MOF*, J. Mater. Chem. A **1**, 13597 (2013). DOI: [10.1039/c3ta12395b](https://doi.org/10.1039/c3ta12395b)

## TALKS AND CONFERENCES

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POSTER PRESENTATIONS     *Calculating Second Order Sensitivity Coefficients For Airport Emissions in the Continental U.S. Using CMAQ-HDDM*

at the 2017 North Carolina BREATHE Conference, at the 2017 UNC Climate Change Symposium

*Using Higher Order Sensitivity Approaches to Assess Aircraft Emissions Impacts on  $O_3$  and  $PM_{2.5}$*

at the 2017 CMAS Conference, at the 2018 North Carolina BREATHE Conference, at the 2018 International Technical Meeting on Air Pollution Modeling and its Application Conference

*A Dynamic Evaluation of Aviation's Contribution to Fine Particulate Matter in the United States*

at the 2018 CMAS Conference

*Estimating the Health Risk Associated with Exposure to Aviation-Attributable  $PM_{2.5}$  from Emission Increases at Individual Airports*

at the 2019 North Carolina BREATHE Conference

*Assessing the co-benefits of climate-related policies in the onroad transportation sector in the Northeast and Mid-Atlantic U.S. on air quality and health*

at the 2019 CMAS Conference

ORAL PRESENTATIONS     *A Dynamic Evaluation of Aviation's Contribution to  $PM_{2.5}$  in the U.S.*

at the 2019 International Technical Meeting on Air Pollution Modeling and its Application Conference

*Calculating Second Order Sensitivity Coefficients For Airport Emissions in the Continental U.S. Using CMAQ-HDDM*

at the 2017 ASCENT Advisory Board Meeting

*A Remedy for Self-Fulfillment: A Mathematical Approach to a Non-Hedonistic Theory of Utilitarianism*

at the George Washington University Undergraduate Philosophy Conference March 2013, the South Carolina Society for Philosophy Conference March 2013

## AWARDS

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SPRING 2017      1st prize Joseph A. Hartman Student Paper Competition  
*Calculating Second Order Sensitivity Coefficients For Airport Emissions  
in the Continental U.S. Using CMAQ-HDDM*

## TEACHING

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SPRING 2016      Teachers Assistantship Awarded  
General Physics II Lab Instructor (One Section)  
Grader for General Physics II (Two Sections)  
Grader for Quantum Mechanics II (One Section)

FALL 2015        Teachers Assistantship Awarded  
General Physics I Lab Instructor (One Section)  
Tutorial Instructor for General Physics II (Two Sections)  
Grader for General Physics II (Two Sections)

SPRING 2014     Teachers Assistantship Awarded  
General Physics II Lab Instructor (Three Sections)  
Grader for Quantum Mechanics II (One Section)

FALL 2013        Teachers Assistantship Awarded  
General Physics I Lab Instructor (Four Sections)

## WORK EXPERIENCE AND SERVICE

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2019–             Research Assistantship funded by the Harvard C-CHANGE TRECH  
Study

2016–2018        Research Assistantship funded by the Federal Aviation Administration

2014–2015        Research Assistantship funded by the Department of Energy

2010–2013        Barista at Starbucks Wake Forest University, Winston-Salem NC

2010              Barista at Starbucks Travel Centers of America, Lodi OH

2009              Landscaper at Rabbit's Foot Garden Center and Bistro, Medina OH

2005–2009        Assistant Instructor at International Karate Centers, Strongsville OH

2015–2016        Monthly visits to local science center, Sci-Works, Winston-Salem NC to  
demonstrate how fuel cells and alternative energy resources work

## COMPUTER SKILLS

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EXPERT            Windows, Mac OSX, Linux/Unix operating systems  
                     Multiprocessor workstations, Deac-cluster (WFU), Killdevil/Dogwood  
                     (UNC), Stampede2 (U. Texas Austin)  
                     First principles computational codes  
                     Community Multi-scale Air Quality Modeling System  
                     BenMAP  
                     Aviation Environmental Design Tool (AEDT)  
                     R  
                     Geographic Information System Software  
                     Relevant visual/graphic programs and word processing programs

FAMILIARITY    Fortran, Python, C++, Matlab, SMOKE