

Educational background

1991	Ph.D.	University of Iowa, <i>Atomic Molecular and Laser Physics</i> .
1987	CERTIFICATE:	International Center for Theoretical Physics; Trieste, Italy.
1985	M.S.	Addis Ababa University <i>Physics: Surface Science</i> .
1977	B.S.	Addis Ababa University <i>Physics Sec. Education/Math minor</i>

Area of field of specialization

Experimental and Theoretical (Computational) Atomic, Molecular and Optical Physics /and Chemical Physics

Teaching and other professional experience

2023-	Adjunct professor, IGSSA, Addis Ababa University, Ethiopia
2009-2010	Adjunct professor, Physics Department Addis Ababa University, Ethiopia
2006-	Director, NOAA-ISET Center
2005	NATO Advanced Institute participant- Erice, Sicily
2004	Fellow: National Institute of Aeronautics (NIA)
2003-Present	Professor
2003	Visiting professor, Laboratory of Theoretical Chemistry Facultes de St-Jerome 13397 MARSEILLE
2000-2001	JILA visiting fellow
2001-2006	Chair, Department of Physics
1998- 2003	Associate Professor, Department of Physics, NCA&T
1993-1998	Assistant Professor: Department of Physics, NCA&T
1997 spring	Acting Chairman: Department of Physics, NCA&T
1996 (summer) and	NRC/HBCU Faculty Fellow: Oak Ridge National Laboratory
1997 (summer)	Chemical and Biological Physics Section
1995(summer)	Visiting Assistant Professor: University of Connecticut, Department of Physics.
1995(summer)	AWU-DOE Faculty Fellow: Los Alamos National Lab.
1994(summer)	Visiting Assistant Professor. University of Utah, Department of Chemistry,
1991-1993	Post-Doctoral Fellow: University of Utah, Chemistry Department
1988-1991	Research Assistant: University of Iowa, Department of Physics
1985-1987	Lecturer: Addis Ababa University, Addis Ababa, Ethiopia.
1983-1985	Research Assistant, Addis Ababa University, Addis Ababa, Ethiopia.

List honors and awards

- Nominated for AGU Fellow
- 2019- Named Outstanding Senior Researcher for A&T (2019-2020)
- 2018-Teacher of the Year for College of Science and Technology
- 2017- Named Outstanding Senior Researcher for A&T
- 2016- Teacher of the Year for College of Arts and Sciences

- 2012 Leader for NCA&T Interdisciplinary Team Award- NCA&T
- **2011-Presidential Award for Excellence in Science, Math, and Engineering Mentoring-2010**
- 2010-University of Iowa, College of Liberal Arts, Alumni Fellow, 2010
- 2006- Teacher of the Year, 2006
- 2001- JILA visiting fellowship, 2001-2002
- 2001- Named Outstanding Senior Researcher for A&T, 2001-2002
- 1998-Outstanding Faculty Mentor Award, NCAMP (NSF) April 1998.
- 1998-Faculty Award, National Honors, College of Arts and Sciences April 1998.

Membership (s) in professional organizations

Member and session organizer:	NSBP: National Society of Black Physicists
Member:	APS: American Physical Society
Member	AGU: American Geophysical Union
Founder and member	EPS: Ethiopian Physics Society and president (2013-2016)
Member	AAAS: American Association for the Advancement of Science
Member	AAPT: American Association of Physics Teachers
Member and session organizer	AMS: American Meteorological Society
Chair-	APS Edward A. Bouchet Award selection committee-2014-2015
Session Chair:	Role of Physics in Geosciences- SESAPS- 2008, 2010, 2013
Associate Member-	Ethiopian Academy of Sciences
Member:	UCAR membership Committee
Editor:	Journal Atmosphere
Review Editor:	Atmosphere and Climate, a section within Frontiers in Environmental Science
Reviewer	Journal of Geophysical Research-Atmosphere
Reviewer	Journal of Geophysical Research- Geohealth
Reviewer	Atmospheric Chemistry and Physics

Summary of research productivity

Peer reviewed publications: 1991-2020	57 + 5- book chapters and reports
Abstracts, proceedings 1991-2020	196
Research grants funded as PI	27 proposals (\$24,549,501)
Research grants funded as Co-PI	4 proposals (\$1,637,691)
Total number of proposals submitted	135, (68) NSF

Previous research

- Spectroscopy of Transition State Dynamics (1988-2004)
- State-to- State Photochemistry (1988-1991)
- Laser Spectroscopy and Photodynamics (1991-1993)
- Electronic Structure Calculations, Quantum calculations (1991-Present)
- Photodetachment of H- (summer 1995) (Los Alamos National Laboratory)
- Photochemistry of Metal CVD precursors in cluster environment and nano chemistry within clusters: Oak Ridge National Laboratory (1996) NCAT: 1999-2005

Current research

Atmospheric Chemistry (2006-

Spectroscopic techniques for atmospheric applications:

The focus is laboratory measurement of optical and physio-chemical properties of biomass burning (BB) aerosol from African fuels.

Laboratory studies are conducted to

- Explore impact of RH, aging, burn condition, morphology fuel type on optical and chemical properties.
- Measure emission factors of pollutants
- Determine the drivers of toxicity in BB emissions
- Model health impacts of biomass burning and trash burning in Africa
- Understand impact on climate and air quality

Modeling: Refractive index and fractal dimensions of fractal aggregates

Field Studies: Field studies participation WINTER, FIREX, (recent)

Completed Projects:

1. Negative Ion proton transfer mass spectrometry to Measure: a) Acidities of gas-phase acids; b) Rate of H-transfer; c) Water cluster characterization. The goal is to get estimates of the free energy of hydration of carboxylate ions, and determination of the effective gas phase acidity of hydrated carboxylate ions.
2. Investigate vibrational overtone initiated photodissociation processes that are significant sources of atmospheric radicals using cavity ring down spectroscopy. The vibrational O-H overtone absorption cross sections of carboxylic acids and other OH-containing species are necessary quantities to calculate the photochemical reaction rate constant (J) for reactions initiated by the excitation of the O-H overtone.
3. Measurement of the Henry's law coefficient and first order loss rate of Isocyanic Acid in Water Solutions-Solubility Studies.
4. Heterogeneous uptake of SO₂ in the presence of non-precipitating clouds during the wintertime. Investigations examining the modification of the mass transport, oxidation, and atmospheric lifetimes of SO₂ due to winter conditions will take place.

Current and former collaborations

- 2000-2008- Laboratoire Aime Cotton and ASCI, Campus d'Orsay, France and,

Laboratory of Theoretical Chemistry Facultes de St-Jerome 13397 MARSEILLE.

Theoretical and computational studies of Li-H₂, Li-N₂ and Li-CH₄ collisions.

- **2000-2006 -Duke University, UNC Chapel Hill and Stanford University:** ITR: Computational Geometry for Structural Biology and Bioinformatics.
- **2001-2002- JILA Research:** Joint Laboratory Astrophysics (NIST)/University of Colorado, Boulder. –Ultra-fast studies of molecular wave packet dynamics and time-resolved FTIR emission studies of molecular photofragmentation.
- **2004- Present – Addis Ababa University: Ethiopia; 2004-present:** geosciences, atmospheric sciences, and statistical physics.
- **2004-2010- PENN STATE, University of the Witwatersrand, South Africa:** Partnership for international research and education program in geosciences.
- **2006-2011-** NOAA –ISET Center **Partner (Subcontract) Minority Serving Institutions:** University of Alaska Southeast (UAS); California State University-Fresno (CSU-Fresno); City University of New York (CUNY), Fisk University (FU); University of North Carolina at Pembroke (UNCP). **Partner (Subcontract) Majority Serving Institution:** North Carolina State University (NCSU); University of Minnesota (UM)
- **2006- present- NOAA-ESRL:** Chemical Sciences Division: Atmospheric Chemistry
- **2010-** Collaborations on NSF-PIRE – six US universities (UC Berkeley, Cornell, NCSU, UCONN, CUNY, Howard) and six universities in five East African countries (Egypt, Ethiopia, Kenya, Tanzania, and Uganda) on an NSF-Partnership for International Research and Education (PIRE) project entitled- The Impact of Climate Change on Hydrology: A Comprehensive Measurement and Modeling Study.
- **2014-** Collaboration between NC New Schools project and Guilford Country Schools on NSF Teacher Professional Development proposal and NASA Educator professional training proposal
- **2018- present- Colorado State University, Howard University-** Recent NSF-HBCU-UP Research Excellence award
- **2019- Present- UNC-Chapel Hill and RTI-** Health Impact studies of Biomass Burning aerosols
- **2015 – Present- University of Washington, Georgia Tech, NOAA Earth Systems Research Lab, Colorado State University, National Center for Atmospheric Research (NCAR)-** on Wintertime Investigation of Transport, Emissions, and Reactivity (WINTER) campaign:
- **2018- Present -Aerodyne Research, NASA, UC-Berkeley, NCAR, Georgia tech, National Forest Service Collaboration** on field study Fire Influence on Regional and Global Environments Experiment (FIREX-AQ):
- **2015- Present-** International Research Collaboration in Geophysics and Air Quality: **Botswana International University of Science and Technology-Botswana, Addis Ababa University of Science and Technology and Addis Ababa University- Ethiopia**
- **2019-** North Carolina State Climate Report Panel member
- **2020-** Georgia Tech, Arizona State University and University of Georgia on NSF-ERC Proposal
- **2020-** Columbia University- Air quality sensor networks and capacity building in East Africa
- **2019-** University of Birmingham- Air Quality Studies in East Africa
- **2021:** UNC-Chapel Hill on a new project on chemical characterization of biomass burning

aerosol