



NORTH CAROLINA
AGRICULTURAL AND TECHNICAL
STATE UNIVERSITY

The Bilign Research Group at the N.C. A&T Department of Physics

Our group uses several laser spectroscopy techniques for atmospheric and environmental applications.

Laboratory Work

The Work in our Laboratory Focuses on (NSF-AGS-1555479)

The study of chemical composition and optical properties of biomass burning aerosols emitted from biomass fuels. Changes in optical properties of soot particles due to internal mixing in the atmosphere and aging are investigated in this project. Aging of aerosols is simulated in our indoor smog chamber.

Ultra-performance liquid chromatography (UPLC) coupled in-line to both a diode array detector (DAD) and high-resolution quadrupole time-of-flight mass spectrometer equipped with an electrospray ionization source will be used to chemically characterize aerosol samples produced in our chamber experiments at UNC-Chapel Hill in Dr. Jason D. Surratt's Lab.

The optical properties of soot aerosols as they age and evolve from chain-like structures into closely packed compact clusters are investigated using T-matrix theory using computational facilities at N.C. A&T-CSE Department and images are taken using electron microscopy at the JSNN facilities.

Field Work

Our Field Work Focuses on the Multiphase Heterogeneous Chemistry of SO₂ under Wintertime Conditions

The N.C. A&T Team was part of the Wintertime Investigation of Transport, Emissions, and Reactivity (WINTER 2015). WINTER is an atmospheric chemistry campaign that focuses on wintertime emissions and chemical processes in the Northeastern US. Our team examined the modification of the mass transport, oxidation, and atmospheric lifetimes of SO₂ due to winter conditions. Analysis of SO₂ emissions from power plants by a comparison of SO₂/CO₂ and NO_y/CO₂ between aircraft and Air Markets Database are being investigated.

**BILIGN
RESEARCH
GROUP**

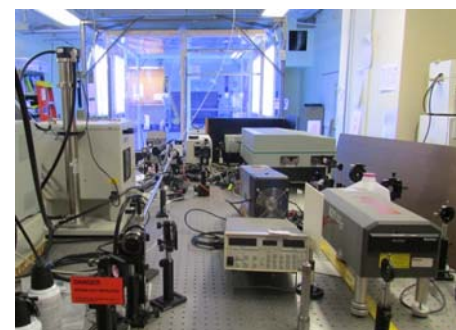
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<http://tinyurl.com/j4lhgx6>



Indoor Smog Chamber

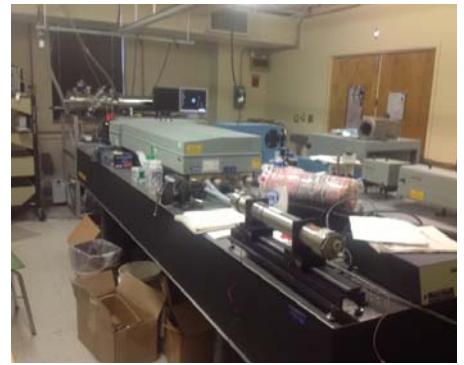


Graduate Students Aboard the
NSF-C-130

New Projects

Laser Induced Breakdown Spectroscopy (LIBS) for Detection of Food and Water Trace Contaminants

LIBS is a powerful technique for rapid, real-time elemental analysis of a wide range of materials, from metal and gemological samples to chemical and biological agents. With LIBS, there is virtually no sample preparation necessary and detection sensitivity is possible to parts-per-million and parts-per-picogram levels.



Other Projects

NSF-IRES-International Research in Geosciences (Earth and Atmospheric Sciences) in Addis Ababa – Ethiopia (NSF-OISE-1559308)

Research areas: Selected IRES students will work alongside research mentors from North Carolina A&T State University, Addis Ababa University (AAU) and Appalachian State University (ASU) to conduct research in:

- Geophysics:-Seismology
- Geothermal Energy Exploration
- Ground Water Exploration
- Atmospheric Sciences: Air quality studies using field measurements



National Science Foundation-GEOPATHS: Pathways to Atmospheric Sciences -Through Immersion in Geosciences Research: NSF-ICER-1600415

Opportunities:

Selected students will work with Atmospheric Sciences faculty at N.C. A&T on research topics listed:

- Optical and radiative properties of aerosols (Bililign)
- Analysis of simulated landfalling hurricanes with numerical weather prediction models (Lin)
- Regional climate modeling (Zhang)
- Investigation of environmental differences between active AEW-convection and non-active AEW-convection over the Atlantic tropical cyclogenesis region (Mekonnen)
- Modeling watershed hydrology for evaluating stream water quality improvement strategies (Jha)

Benefits:

- Stipends up to \$3000/semester
- Paid travel to Colorado to visit Colorado State University, the National Center for Atmospheric Research,
- Individualized mentoring by distinguished faculty at N.C. A&T and Colorado State University
- Exposure to Interdisciplinary research and education and research in socially relevant issues.



The Bililign group 2016-17: Senior research associate-Dr. Fiddler, Visiting scientist Dr. Keyeta :PhD students-Smith and Green, , Physics Grad Student Poudel; undergraduates McMillan ,Dowdell, Rhym and Spann

Please Contact Us

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