Brandon J.N. Long

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*An expert in optical and electronic experimental techniques, driven to build and deliver products that make people’s lives better.*

WOrk Experience

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| --- | --- |
| Single Particle Measurement Postdoctorate * Developed Peltier and liquid nitrogen solutions for cooling single particle slides
* Developed single particle NSOM (Near-field Scanning Optical Microscope) functionalized tips.
	+ Developed experimental methods to attach single particles to nanoscopic structures.
	+ Developed and calibrating nano-Newton force measurements.
* Measured the luminescence response to stress of single upconverting nanoparticles
* Lectured undergraduates in Physics, including a transition to online-only education mid semester due to Covid-19
 | 01/2020-CurrentNC State University*Supervisor:**Dr. Shuang Fang Lim* |
| In-home Tutor * + Travelled to students’ homes
	+ Assisted with homework
	+ Provided supplemental instruction
	+ Prepared students for SAT testing
 | 09/2019-01/2020BrainTrust Tutoring*Contractor*  |
| Experimental Physics Graduate Student * Biochemical Spectroscopy:
	+ Used a micro-Raman system to analyze organic material found in dinosaur bones for hemoglobin.
		- Investigated tightly defined microscale chemical domains in the sample.
		- Used Resonance techniques to create a double-selectivity test to focus on single molecular constituents.
			* Investigated resonance phenomena
			* Characterized resonance mechanism
		- Studied modern and ancient samples to show degradation of the molecules.
		- Implemented non-linear background subtraction methods to deal with fluorescent backgrounds.
		- Used micro-Raman systems to create a spectral images of tissues and extra-cellular matrices.
	+ Used a micro-Raman system to probe for iron impurities in a diamond-like coating.
	+ Built a multi-wavelength micro-Raman system
	+ Extensive experience with low-light, low-signal spectroscopic analysis.
* Scanning Probe Microscope:
	+ Used a custom NSOM (Near-field Scanning Optical Microscope) to fabricate highly controlled polymer alignment.
		- Used nanoscale patterning to align a few monomers of a polymer at a time.
		- Used solvent vapor annealing techniques to allow for molecular manipulation.
	+ Built an NSOM that met intensive experimental constraints.
		- Created mechanically stable environments for 12-24 hour scanning probe acquisition.
		- Created systems able to heat and wet a sample without damaging or destabilizing the apparatus.
	+ Fabricated unique NSOM probes with two electrodes (Split-tip probes).
		- Discovered undocumented processing steps.
		- Greatly speeded fabrication (1 month -> 5 seconds).
		- Improved holder for long-term stability under experimental conditions.
 | 08/2010-12/2019NC State University*Supervisor:* *Dr Hans Hallen* |
| Scanning Probe Technician on Non-Linear NSOM * Created a novel NSOM apparatus for non-linear optical measurements.
* Led training, development, and maintenance of NSOM apparatus for a new lab
	+ Remote maintenance of NSOM apparatus.
	+ Trained new users on NSOM techniques.
	+ Travelled to repair and debug apparatus
* Created & supplied NSOM tips to collaborators.
 | 08/2017-07/2019NC State UniversityCollaboration with Pennsylvania State University*Supervisors: Dr Hans Hallen**Dr Zhiwen Liu* |
| Physics Undergraduate Lecturer * Writing & delivering lectures to students.
* Preparing and using demonstrations.
* Tutoring students.
* Writing Tests.
 | 08/2014-12/2014NC State University*Supervisor:* *Colleen Lanz* |
| Aerosol Research Staff* Created field measurement apparatuses for
	+ Multistatic aerosol scattering
	+ Aureole aerosol scattering
* Performed field measurements of aerosol scattering by variously dense dust clouds, in collaboration with other groups
* Used Mie and T-matrix modeling to predict aerosol particulate index of refraction.
* Developed a tabletop apparatus for measuring aureole scattering of aerosols suspended in a viscous medium, replacing cloud chamber measurements.
	+ Development of experimental apparatus
	+ Development of several sample suspension techniques
* Performed dust index of refraction measurements, from visible to IR wavelengths
 | 08/2011-07/2013NC State UniversityCollaboration with Army Night Vision; Johns Hopkins APL*Supervisors:**Dr Hans Hallen* *Dr Russell Philbrick* |
| Undergraduate Physics Lab TA * + Setting up & running labs
	+ Teaching basic physics
	+ Lab management
	+ Managing other TAs
	+ Mentoring Undergraduates
 | 08/2010-07/201108/2013-07/201401/2015-07/2017 (Lead TA)NC State university*Supervisor:**Robert Egler* |

EDUCATION

Doctorate: Physics at North Carolina State University 2010-2019

Completed coursework 2012; Candidate 2014
Thesis Topic: “Morphology, Chemistry and Domain Studies of Disparate Mesoscale Organic Systems: Patterned Conjugated Polymers and Preserved Ancient Molecules”

Bachelor of Science: Physics at North Carolina State University 2006-2010

skills & Proficiencies:

Computational Programming: Matlab, Labview, Excel, C++

Scientific Communication: Training Users, Managing Small Groups, Presenting in Scientific Communities, Writing Grants

Spectroscopy: Xray Photon Scattering, Aerosol Scattering, Raman Spectroscopy

Nanoscale Fabrication: Thin film deposition, Wet Etching, Photoresist Techniques

Other: Scanning Probe Microscopy, Atomic Force Microscopy, Circuit & metal fabrication, Laser repair

Publications:

* **Brandon J.N. Long**, Wenxia Zheng, Mary Schweitzer, Hans D. Hallen; *Resonance Raman Imagery of
Semi-Fossilized Soft Tissues,* SPIE Optics + Photonics, August 2018 (Invited)
* **Brandon J.N. Long**, Evan R. Adamek, Hans D Hallen; *Direct nanoscale patterning of in-plane-aligned polymer via split-tip NSOM*, APS March Meeting 2019
* Ling Li, Shuang Fang Lim, Alexander Puretzy, **Brandon J.N. Long**, Robert Riehn, Hans D. Hallen; *DNA methylation detection using UV nano bowtie enhanced Raman spectroscopy,* SPIE Optics + Photonics, August 2018
* **Brandon J.N. Long**, D. A. Hook, Garret E. Pangle, Hans D. Hallen, C. Russell Philbrick; *Using a laser aureole to study aerosols,* SPIE DSS, May 2013.
* Hans D. Hallen, **Brandon J. N. Long,** D. Adam Hook, Garrett E. Pangle, and C. Russell Philbrick; *Multistatic lidar measurements of non-spherical aerosols*, SPIE DSS, May 2013.
* D. Adam Hook, Garrett E. Pangle, **Brandon J.N. Long**, C. Russell Philbrick, and Hans D. Hallen; *Understanding lidar returns from complex dust mixtures*, SPIE DSS, May 2013.
* Garrett E. Pangle, D. Adam Hook, **Brandon J. N. Long**, C. Russell Philbrick, and Hans D. Hallen; *Optical extinction dependence on wavelength and size distribution of airborne dust*, SPIE DSS, May 2013.

CURRENT RESEARCH

* **Brandon J.N. Long,** Hans Hallen;  *Modern Advances in Res. Raman Spectroscopy in Organic and Complex Systems* Journal of Physics: Photonics, under review
* **Brandon J.N. Long,** Wenxia Zheng, Mary Schweitzer, Hans D. Hallen; *Resonance Raman of Semi-Fossilized Soft Tissues*(in progress)
* **Brandon J.N. Long,** Evan R Adamek, Shuang Fang Lim, Robert Reihn, Hans Hallen; *Fabrication of In-Plane Aligned Conducting Polymers via Poling Using a Custom Scanning Probe Microscope* (in progress)

CONFERENCE ACTIVITIES

* Session Chair: Ultrafast Sources and Applications, SPIE Optics + Photonics, August 2018

Undergraduate Research Experience:

* Worked on a nanometer spatial resolution Raman system.
* Applied for and received Undergrad Research Grant.
* Presented research in NCSU Undergrad Research Symposium.
* Received Honorable Mention for Rodney I McCormick award.

OTHER SKILLS AND WORK EXPERIENCE:

* Volunteered as a Set Design and Technical Theater worker at a local High School (2000-2002)
	+ Worked on and ran 4 theatrical productions and various smaller events
	+ Received “Golden Caster” award for excellence in Technical design
* Worked as a handyman on several construction sites (2007)
* Conversational in German