Joseph Neumann

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Summary

My goal with the CAREERS Cyberteam project is to use the additional computing resources to run high-fidelity simulations of light scattering. More specifically, I would simulate the paths and distribution of many individual photons as they scatter along surfaces in the ways that would be expected by Mie scattering and its relevant mathematical framework.

I already have a modest version of the code available. My current build covers generic scattering distribution functions and is not tailored for Mie scattering. The math which characterizes Mie scattering involves more computationally heavy functions like Bessel functions. That means that computationally speaking I'm held back with the hardware I have right now.

Undergraduate Education

- Dual major in Math and Physics at Southern Connecticut State University
  - Math GPA: 3.35
  - Physics GPA: 3.18
  - Cumulative GPA: 3.44
- SCSU Honors College member since 2016
- Working towards a Minor in Computer Science

Scientific Research Experience

I went to Amity Regional High School and was enrolled in their Science Research Program for four years. My first year's project was done without professional guidance but the three subsequent years involved work with researchers across Southern Connecticut State University and the University of Connecticut. I didn't have much autonomy with this project but I received plenty of experience understanding the logistics and proceedings in scientific research.

2012 – 2013

I worked alongside SCSU faculty such as Dr. Christine Broadbridge and Dr. Todd Schwendemann and analyzed scans of carbon nanotubes which were created under certain

controlled conditions. I mostly worked on analyzing data and looking for correlations between CNT thickness and the temperature of the precursor gas used to make the CNT's.

2013 – 2014

I worked alongside Dr. Jason Hancock at the University of Connecticut. I had much more control over the type of research I was able to conduct. We studied the distribution and roundness/eccentricity of magnetic nanoparticles in ferrofluids suspended in a mineral oil solution. More specifically, we wanted to record changes in distribution and eccentricity as we increased the strength of an increasing magnetic field (field uniformity was limited by the equipment available at the time).

2014 – 2015

I participated in UConn's "Mentor Connection" program which ran during the summer of 2014. I worked alongside some members of the Complex Fluids Laboratory and some graduate students. We worked on using sonication to control the size of nanotubes when produced in large batches.

Programming/Computer Skills

- Python
- C++
- MatLab/Octave
- Image software like Photoshop and GIMP