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Brandon J. Nelson

Education

2016-2021 **PhD Candidate in Biomedical Engineering**, *Mayo Clinic Graduate School of Biomedical Sciences*, Rochester, MN, *GPA – 3.85.*
Dissertation Title: "Preclinical Phase Contrast Lung Imaging: Challenges and Opportunities"
Advisor: Cynthia McCollough, Ph.D.

2012-2016 **BA in Physics, *cum laude***, *Carleton College*, Northfield, MN, *GPA – 3.82.*

Research Experience

Spring 2017 - Present **Graduate Researcher**, *CT Clinical Innovation Center*, Mayo Clinic, Rochester, MN.
–Designed, built, and programmed Talbot-Lau grating interferometer micro-CT system for x-ray phase contrast imaging of mouse models of lung disease.
Advisor: Cynthia McCollough, Ph.D.

Fall 2014 - Spring 2016 **Undergraduate Researcher**, *Carleton College Physics Department*, Northfield, MN.
–Built laser-optics prototype for studying Bose-Einstein Condensates.
Advisor: Eric Hazlett, Ph.D.

Summer 2014 **NIH Summer Internship Program**, *National Institutes of Health, National Heart, Lung, and Blood Institute, Laboratory of Molecular Biophysics*, Bethesda, MD.
–Investigated laser performance for application in single molecule biophysics experiments.
Advisor: Keir Neuman, Ph.D.

Summer 2013 **Summer Research Internship**, *McLaughlin Research Institute*, Great Falls, MT.
–Investigated surface protein interactions on mitochondria using cell biology techniques.
Advisor: Teresa Gunn, Ph.D.

Publications

2020 **Nelson, B**; Leng, S; Shanblatt, E; McCollough, C; Koenig, T; "Empirical Beam Hardening Correction for Grating Interferometry (EBHC-GI)" *Medical Physics*. https://doi.org/10.1002/mp.14672

2020 Sung, Y; **Nelson, B**; Shanblatt, E; Gupta, R; ; McCollough, C.; Graves, W. "Wave-optics simulation of grating-based X-ray phase-contrast imaging using 4D Mouse Whole Body (MOBY) phantom." *Medical Physics*, 47: 5761-5771. https://doi.org/10.1002/mp.14479

2019 Shanblatt, E; Missert, A; **Nelson, B**; Leng, S; McCollough, C. "Projection-Domain Convolutional Neural Network Denoising for X-Ray Phase-Contrast Micro Computed Tomography." *Medical Physics* 46(6) pp E192 (11 June 2019) doi:10.1002/mp.13630

2019 Shanblatt, E; **Nelson, B**; Tao, S; Leng, S; McCollough, C. "Demonstration of phase-assisted material decomposition with a Talbot-Lau interferometer using a single x-ray tube potential." *Proceedings of SPIE Medical Imaging*, vol 10948, id 109482W. doi:10.117/12.2511806

2019 **Nelson, B**; Koenig, T; Shanblatt, S; Leng, S; "Visibility Guided Phase Denoising." *Proceedings of SPIE Medical Imaging*, Vol 10948, id 109484V 0. doi:10.1117/12.2511212;

2019 Shanblatt, E; Sung, Y; Gupta, R; **Nelson, B**; Leng, S; Graves, W; McCollough, C. (2019 in press) "Forward model for propagation-based x-ray phase contrast imaging in parallel- and cone-beam geometry." *Optics Express*, vol 27(4), 7 February, 2019 doi:10.1364/OE.27.004504

2017 Sung, Y; Gupta, R; **Nelson, B**; Leng, S; McCollough, C; Graves, W. (2017) "Phase-contrast imaging with a compact x-ray light source: System design." *Journal of Medical Imaging* 4(4), 043503 (23 November 2017) doi:10.1117/1.JMI.4.4.043503

Presentations

July 12-16, 2020 **Poster Presentation**, *"CNR Dependence on Spatial Resolution and Subject Contrast in Phase Contrast CT "*, Joint AAPM/COMP Meeting, Vancouver, BC (virtual).

July 1-14, 2019 **Invited Lecturer**, *"Practical English for the Engineering Physicist"*, Tsinghua University, Beijing, China.
Organized and delivered two week course to second year Engineering Physics undergraduates including work shopping to improve scientific presentation skills.

February 2019 **Poster Presentation**, *"Visibility Guided Phase Contrast Denoising*, SPIE Medical Imaging Conference 2019, San Diego, CA.

October 17-29, 2018 **Poster Presentation**, *"Methods for Generating and Viewing CT Images Containing Multiple Kernels, Slice Thicknesses, and Display Settings"*, Biomedical Engineering Society, Atlanta, GA.

September 1-14, 2018 **Invited Lecturer**, *"Practical English for the Engineering Physicist"*, Tsinghua University, Beijing, China.
Organized and delivered two week course to second year Engineering Physics undergraduates including work shopping to improve scientific presentation skills.

May 20-23, 2018 **Poster Presentation**, *"Simulation of a Propagation-Based Phase-Contrast Imaging system with a compact x-ray light source"*, International Conference on Image Formation in X-ray Computed Tomography, Salt Lake City, Utah.

Awards

Febuary 2019 **Medical Physics Poster Award**, *SPIE Medical Imaging Conference 2019*, San Diego, CA.
Poster on Visibility Guided Phase Contrast Denoising

September 26, 2018 **Travel Award**, *Three Minute Thesis Competition*, Mayo Clinic, Rochester, MN.
Oration competition to convey a research topic to a public audience in three minutes.

Summer 2015 **TUSA Ambassador Summer Scholar**, *Nation Cheng Kung University*, Tainan City, Taiwan.
Student tuition and travel award sponsored by Taiwan-US Sister Relations Alliance to study Mandarin Chinese at National Cheng Kung University in Tainan and teach English.

Fall 2012 **Minneapolis Rotary Club College Scholarship**, *Rotary Club #9*, Minneapolis, MN.

Teaching Experience

Fall 2018 **Visiting Student Mentor**, *CT Clinical Innovation Center*, Mentored visiting master's student to design x-ray phase contrast simulation for a master's thesis project.

Fall 2017-Present **Teaching Assistant**, *Mayo Clinic Graduate School of Biomedical Sciences*, Rochester, MN.
Delivering select lectures, organizing class periods, interactive labs, tutoring, and grading of assignments for "Introduction to Medical Imaging" course.

2016 **Teaching Assistant**, *Carleton College Physics Department*, Northfield, MN.
Lab assistant, tutor, and grader for modern physics and introductory courses.

Technical Skills

Programming languages: Julia, Python, C/C++, MATLAB

Spoken languages: Mandarin Chinese: reading, writing, speaking with conversational fluency and 7+ years experience.