Exponent®
Engineering & Scientific Consulting

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Professional Profile

Helena Hall is a Scientist in the Electrical Engineering and Computer Science Practice at Exponent specializing in optical physics and nanoscale imaging techniques. Dr. Hall brings deep expertise in laser systems, single molecule force spectroscopy, and digital image and signal processing. She has extensive experience in software development and programming for scientific applications and is skilled at distilling large amounts of data into clear, actionable insights.

Prior to joining Exponent, Dr. Hall held an internship at Amgen, where she contributed to the characterization of monoclonal antibodies using mass spectrometry. Her technical background also includes hands-on experience with scanning tunneling microscopy (STM), atomic force microscopy (AFM), and fluorescence imaging techniques. In addition to her experimental work, Dr. Hall has developed custom software for data collection, analysis, and visualization and has extensive experience in MATLAB, Python, LabVIEW, R, and LaTeX. Her doctoral research at Northeastern University involved using an optical tweezers laser system to unfold mechanically deformed DNA. Combining experimental data with computational polymer modeling allowed her to uncover key insights related to the early stages of HIV infection.

Academic Credentials & Professional Honors

Ph.D., Physics, Northeastern University, 2025

B.S., Physics, University of Georgia, 2018

Northeastern LEADERs Fellow

Lawrence Award for Excellence in Teaching

Publications

Gien H, Rouzina I, Morse M, McCauley MJ, Williams MC. Single molecule measurements of double-stranded DNA condensation. Biophysical Journal 2025.

Gien H, Morse M, McCauley MJ, Rouzina I, Gorelick RJ, Williams MC. Cationic Residues of the HIV-1 nucleocapsid protein enable DNA condensation to maintain viral core particle stability during reverse transcription. Viruses 2024; 16(6):872.

Gien H, Morse M, McCauley MJ, Kitzrow JP, Musier-Forsyth K, Gorelick RJ, ... Williams MC. HIV-1 nucleocapsid protein binds double-stranded DNA in multiple modes to regulate compaction and capsid uncoating. Viruses (2022; 14(2):235.

Presentations

Gien H. Cationic residues of the HIV-1 nucleocapsid protein enable DNA condensation to maintain viral core particle stability during reverse transcription. Presented at the Gordon Research Conference for Single Molecule Approaches to Biology, 2024.

Gien H. Basic residues of HIV-1 nucleocapsid protein modulate DNA condensation function and viral replication. Presented at the 68th Annual Meeting of the Biophysical Society, Philadelphia, PA, 2024.

Gien H. Basic residues of HIV-1 nucleocapsid protein are essential for DNA condensation function congruent with capsid stability. Presented at the 12th International Retroviral Symposium: Assembly, Maturation and Uncoating, 2023.

Gien H. HIV-1 nucleocapsid protein binds double-stranded DNA in multiple modes to regulate compaction and capsid uncoating. Presented at the 67th Annual Meeting of the Biophysical Society, San Diego, CA, 2023.

Gien H. HIV-1 nucleocapsid protein binds double stranded DNA in multiple modes for maximum density compaction. Presented at the 66th Annual Meeting of the Biophysical Society, San Francisco, CA, 2022.

Gien H. Mechanism of HIV-1 NC protein-induced condensation of double stranded DNA as a model for DNA compaction during reverse transcription. Presented at the 65th Annual Meeting of the Biophysical Society, virtually, 2021.

Peer Reviews

Biophysical Journal

Nucleic Acids Research