

# JONATHAN D. SCHULTZ

Assistant Professor of Chemistry, North Carolina Central University

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## EDUCATION

### Northwestern University, Evanston, IL

Thesis: "Revealing Vibronic Coupling and Coherence in Molecular Aggregates with Multidimensional Spectroscopy: Experiment and Theory"

**Sep 2022**

### University of Minnesota-Twin Cities, Minneapolis, MN

B.S. degrees in Chemical Engineering and Chemistry

GPA: 3.733, *cum laude*

**May 2017**

Thesis: "Nanoparticle Applications Spanning Enhanced Ultrafast Sensing and Groundwater Remediation"

## ACADEMIC APPOINTMENTS & RESEARCH

### Assistant Professor of Chemistry

**Aug 2025 - present**

North Carolina Central University (NCCU)

- Establishing an undergraduate-centered research program integrating spectroscopy, quantum simulations, and machine learning.

### Arnold O. Beckman Postdoctoral Fellow

**Jul 2023 - Aug 2025**

Duke University; Advisor: Prof. David N. Beratan

- Developed machine-learning tools to extract molecular insights from optical spectroscopic data.

### Postdoctoral Associate

**Jul 2022 - Aug 2025**

Duke University; Advisor: Prof. David N. Beratan

- Employed quantum dynamics simulations and computations to reveal transport mechanisms in materials and biological systems

### Ph.D. Researcher

**Jul 2017 - Jul 2022**

Northwestern University; Advisors: Profs. Michael R. Wasielewski & Mark A. Ratner

- Used multidimensional optical spectroscopy experiment and theory to investigate vibronic coherence phenomena in synthetic organic materials

### Undergraduate Researcher

**Dec 2015 - May 2017**

University of Minnesota Twin Cities; Advisors: Profs. Renee R. Frontiera & R. Lee Penn

### NSF REU Researcher

**May 2015 - Aug 2015**

Pennsylvania State University; Advisor: Prof. Benjamin J. Lear

## SELECTED PUBLICATIONS

(\*Corresponding author; <sup>t</sup>Equal contribution)

### Using machine learning to map simulated noisy and laser-limited multidimensional spectra to molecular electronic couplings.

Schultz, J. D.\*; Parker, K. A.\*; Sbaiti, B.; Beratan, D. N. *Digit. Discov.* 2025, 4, 1912-1924.

### Machine learning for video classification enables quantifying intermolecular couplings from simulated time-evolved multidimensional spectra.

Sbaiti, B.; Schultz, J. D.\*; Parker, K. A.\*; Beratan, D. N.\* *J. Phys. Chem. Lett.* 2025, 16 (19), 4707-4714.

### Efficiency limits of energy conversion by light-driven redox chains.

Schultz, J. D.; Parker, K.; Therien, M.; Beratan, D. N.\* *J. Am. Chem. Soc.* 2024, 146(47), 32805-3281.

### **Coherence Phenomena in Chemistry: Foundations and Frontiers.**

Schultz, J. D.<sup>†\*</sup>; Yuly, J.<sup>†\*</sup>; Arsenault, E.; Parker, K.; Chowdhury, S.; Dani, R.; Kundu, S; Nuomin, H.; Zhang, Z.; Valdiviezo, J.; Zhang, P.; Orcutt, K.; Jang, S. J.; Fleming, G. R.; Makri, N.; Ogilvie, J.; Therien, M.; Wasielewski, M. R.; Beratan, D. N.\* *Chem. Rev.* 2024, 124 (21), 11641-11766.

### **Accelerating symmetry-breaking charge separation in a perylenediimide trimer through a vibronically coherent dimer intermediate.**

Lin, C.<sup>†</sup>; Kim, T.<sup>†</sup>; Schultz, J. D.; Young, R. M.; Wasielewski, M. R.\* *Nat. Chem.* 2022, 14, 786-793

### **Coupling between harmonic vibrations influences quantum beating signatures in two-dimensional electronic spectra.**

Schultz, J. D.; Kim, T.; O'Connor, J. P.; Young, R. M.; Wasielewski, M. R.\* *J. Phys. Chem. C.* 2022, 126 (1), 120-131

### **Influence of Vibronic Coupling on Ultrafast Singlet Fission in a Linear Terrylenediimide Dimer.**

Schultz, J. D.<sup>†</sup>; Shin, J. Y.<sup>†</sup>; Chen, M.; O'Connor, J. P.; Young, R. M.; Ratner, M.A.; Wasielewski, M. R.\* *J. Am. Chem. Soc.* 2021, 143 (4), 2049-2058

### **Steric Interactions Impact Vibronic and Vibrational Coherences in Perylenediimide Cyclophanes.**

Schultz, J. D.; Coleman, A. F.; Mandal, A.; Ratner, M. A; Young, R. M.\*; Wasielewski, M. R.\* *J. Phys. Chem. Lett.* 2019, 10, 7498-7504

### **Photothermal effectiveness of magnetite nanoparticles: Dependence upon particle size probed by experiment and simulation.**

Johnson, R. J. G.; Schultz, J. D.; Lear, B. J.\* *Molecules* 2018, 23 (5), 1234

## **COURSES TAUGHT**

|   |                             |
|---|-----------------------------|
| <b>CHEM 1100: General Chemistry I</b><br><i>North Carolina Central University</i>   | <b>Fall 2025</b>            |
| <b>CHEM 190FS: Microscopic Phenomena in the Macroscopic World</b><br><i>Duke University (FOCUS Program) - Original course</i> | <b>Fall 2022, Fall 2023</b> |

## **GRANTS & FELLOWSHIPS**

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|--|-----------------|
| <b>Arnold O. Beckman Postdoctoral Fellowship</b> , Arnold & Mabel Beckman Foundation | <b>Apr 2023</b> |
| <b>Graduate Teaching Fellowship</b> , Northwestern University                        | <b>May 2020</b> |
| <b>National Science Foundation Graduate Research Fellowship</b>                      | <b>Mar 2017</b> |

## **SELECTED PRESENTATIONS**

|  |                 |
|--|-----------------|
| <b>Invited talk</b> – Arnold & Mabel Beckman Foundation Symposium, Irvine, CA              | <b>Jul 2025</b> |
| <b>Invited talk</b> – Sungkyunkwan University, Seoul, South Korea                          | <b>Jul 2024</b> |
| <b>Contributed talk</b> – Workshop, Korea Institute for Advanced Study, Seoul, South Korea | <b>Jul 2024</b> |
| <b>Poster</b> – NYU Shanghai (Symposium), Shanghai, China                                  | <b>Jun 2024</b> |
| <b>Contributed talk</b> – TriMolS Symposium, Duke University, Durham, NC                   | <b>May 2024</b> |
| <b>Contributed talk</b> – Southeast Regional Meeting of the ACS, Durham, NC                | <b>Oct 2023</b> |
| <b>Poster</b> – Schaap Symposium, Hope College, Holland, MI                                | <b>May 2023</b> |
| <b>Contributed talk</b> – ACS National Meeting, virtual                                    | <b>Aug 2021</b> |
| <b>Poster</b> – International Conference, University of Auckland, Auckland, New Zealand    | <b>Sep 2019</b> |
| <b>Contributed talk</b> – REU Symposium, Pennsylvania State University, State College, PA  | <b>Jul 2015</b> |