

Austin P. Spencer

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Optical scientist with 10+ years of research experience in optics, materials, and computation.

- Extensive experience in *optical design*, both in prototype development and modeling.
- Experienced *team project manager* with proven leadership, mentoring, and collaboration skills in carrying out full cycle product development.
- Strong record of *effective communication* evidenced through research presentations and scientific writing, with **20+ peer-reviewed publications**.
- *Adaptable* to varying projects, mastering new skills as needed to complete an objective.

Technical skills

- **Optics and lasers** – diffractive, refractive, and polarization-sensitive optics – optical coatings – linear and nonlinear optics – light characterization (spatial, temporal, and spectral)
- **Data analysis and modeling** – optical modeling and ray tracing – Fourier methods – signal and image processing – global analysis methods – linear and nonlinear optimization
- **Experiment/instrument development** – interferometric system design – robust optical design – technique characterization, calibration, and documentation
- **Materials** – nanomaterials – thin films – semiconductors – organic polymers and molecules
- **Software development** – instrument control and real-time synchronization
- **Programming** – Python – MATLAB – JMP – LabVIEW – C – Bash – Fortran – Java
- **Electronic engineering** – analog – digital – microcontrollers – PCB design

Education

Ph.D. in Physical Chemistry; University of Colorado Boulder 2014
B.S. Chemistry, Computer Science; University of North Carolina at Chapel Hill 2009

Experience

Research Scientist 2022–present
Cree-LED; Durham, NC

- Lead product development, from initial concept through implementation and qualification.

Laser Physicist 2020–2022
Dynamic Compression Sector, Argonne National Laboratory

- Developed and operated a 100 J UV laser system as a driver for laser shock experiments.
- Designed optical assemblies and diagnostics for improved laser performance and monitoring.

Postdoctoral Researcher 2014–2020

Northwestern University, Department of Chemistry

- Developed multidimensional spectroscopy methods that imprint and probe transient holographic gratings in solution and solid materials.
- Created optical instrumentation for investigating the electronic and vibrational dynamics of thin films, polymers, and nanomaterials.
- Demonstrated a compressive sensing detection scheme utilizing a digital micromirror array and a single-element detector that captured n-pixel images with $\ll n$ measurements.

Research Assistant 2009–2014

University of Colorado Boulder, Department of Chemistry and Biochemistry

- Simulated optical propagation in absorbing materials for modeling of multidimensional Fourier-transform spectra.
- Conceived, designed, and built a beam scanning apparatus for studying solution-phase and thin film nano-particle samples without repetitive excitation.

Undergraduate Researcher 2007–2009

University of North Carolina at Chapel Hill

- Investigated UV photodissociation and thermochemistry of halo-alkanes.

Honors and Recognitions

Cover & Feature article in *The Journal of Physical Chemistry C* 2018
"Four-Dimensional Coherent Spectroscopy of Complex Molecular Systems in Solution"

Development of 4D electronic–Raman spectroscopy highlighted in *Science* 2017
J. Goodknight, A. Aspuru-Guzik. Taking six-dimensional spectra in finite time. *Science* **2017**, 356, 1333–1333; DOI: [10.1126/science.aan2842](https://doi.org/10.1126/science.aan2842)

Summer Undergraduate Research Fellowship 2008
University of North Carolina at Chapel Hill

Eagle Scout

Selected publications

1. A. P. Spencer, W. O. Hutson, E. Harel. Four-Dimensional Coherent Spectroscopy of Complex Molecular Systems in Solution. *J. Phys. Chem. C* **2018**; DOI: [10.1021/acs.jpcc.8b09184](https://doi.org/10.1021/acs.jpcc.8b09184)
2. A. P. Spencer, R. J. Hill, W. K. Peters, D. Baranov, B. Cho, A. Huerta-Viga, A. R. Carollo, A. C. Curtis, D. M. Jonas. Sample exchange by beam scanning with applications to noncollinear pump–probe spectroscopy at kilohertz repetition rates. *Rev. Sci. Instrum.* **2017**, 88, 064101; DOI: [10.1063/1.4986628](https://doi.org/10.1063/1.4986628)
3. A. P. Spencer, B. Spokoyny, S. Ray, F. Sarvari, E. Harel. Mapping multidimensional electronic structure and ultrafast dynamics with single-element detection and compressive sensing. *Nat. Commun.* **2016**, 7, 10434; DOI: [10.1038/ncomms10434](https://doi.org/10.1038/ncomms10434)
4. A. P. Spencer, H. Li, S. T. Cundiff, D. M. Jonas. Pulse Propagation Effects in Optical 2D Fourier-Transform Spectroscopy: Theory. *J. Phys. Chem. A* **2015**, 119, 3936–3960; DOI: [10.1021/acs.jpca.5b00001](https://doi.org/10.1021/acs.jpca.5b00001)