



Jake D Koralek

Staff Scientist, LCLS - Linac Coherent Light Source

Bio

BIO

I am a condensed matter physicist with research interests in quantum materials, ultrafast optics and X-ray science. I grew up in the Stanford neighborhood where I attended Palo Alto High School. I went on to the College of Creative Studies at UCSB where I worked in the lab of David Awschalom studying semiconductor spintronics. I got my PhD in physics from the University of Colorado, Boulder, working with Dan Dessau, where we developed the first system to perform angle-resolved photoemission spectroscopy (ARPES) using a table-top laser rather than a large synchrotron facility. I moved to Lawrence Berkeley National Lab for my postdoctoral research with Joe Orenstein where we applied a wide variety of ultrafast optical techniques to study emergent properties in quantum materials and semiconductor devices. I stayed in Berkeley to work with Bob Schoenlein developing ultrafast X-ray techniques to study quantum materials. In 2014 I moved to SLAC where I am now a staff scientist in the Materials Science Department at the Linac Coherent Light Source (LCLS), the world's first X-ray free-electron laser.

EDUCATION AND CERTIFICATIONS

- BS, University of California, Santa Barbara, College of Creative Studies , Physics (1999)
- PhD, University of Colorado, Boulder , Physics (2006)

Publications

PUBLICATIONS

- **Liquid Heterostructures: Generation of Liquid-Liquid Interfaces in Free-Flowing Liquid Sheets.** *Langmuir : the ACS journal of surfaces and colloids*
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- **From a Single-Band Metal to a High-Temperature Superconductor via Two Thermal Phase Transitions** *SCIENCE*
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- **Laser based angle-resolved photoemission, the sudden approximation, and quasiparticle-like spectral peaks in Bi₂Sr₂CaCu₂O₈+ δ** *PHYSICAL REVIEW LETTERS*
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- **Surface structure of water from soft X-ray second harmonic generation.** *Nature communications*
Hoffman, D. J., Devlin, S. W., Garratt, D., Jamnuch, S., Spies, J. A., Nebgen, B. R., Schacher, D., Do, A., Bernal, F., Riffe, E. J., Kunnus, K., Hampton, C. Y., Duris, et al
2025; 16 (1): 10522
- **Entropy or Enthalpy? Second Harmonic Generation from Liquid Sheets Reveals Different Ion Adsorption Mechanisms for Air-Water and Oil-Water Interfaces.** *Journal of the American Chemical Society*
Devlin, S. W., Hoffman, D. J., Koralek, J. D., Saykally, R. J.
2025
- **Attosecond-pump attosecond-probe x-ray spectroscopy of liquid water.** *Science (New York, N.Y.)*
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- **Spontaneous fluctuations in a magnetic Fe/Gd skyrmion lattice** *PHYSICAL REVIEW RESEARCH*
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- **Antivitamins B12 in a Microdrop: The Excited-State Structure of a Precious Sample Using Transient Polarized X-ray Absorption Near-Edge Structure.** *The journal of physical chemistry letters*
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- **The rate of quasiparticle recombination probes the onset of coherence in cuprate superconductors** *SCIENTIFIC REPORTS*
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- **New collective mode in YBa₂Cu₃O_{6+x} observed by time-domain reflectometry** *PHYSICAL REVIEW B*
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