

J. Steven Dodge

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ACADEMIC POSITIONS

Simon Fraser University, Department of Physics

Associate Professor, 2007–.

Assistant Professor, 2000–2007.

E. O. Lawrence Berkeley National Laboratory, Materials Sciences Division

Postdoctoral Researcher, 1997–2000. Time-resolved spectroscopy of correlated electron systems, with Daniel S. Chemla and Joe Orenstein.

EDUCATION

Ph.D. in Applied Physics, Stanford University, 1997.

Dissertation: “Magneto-optics of transition metal oxides and Sagnac magneto-optic interferometry.”

Advisor: Aharon Kapitulnik.

A.B. with Honours in Physics, Harvard College, 1989.

RESEARCH INTERESTS

Condensed matter physics; Optical spectroscopy; Time-resolved spectroscopy; Terahertz spectroscopy.

HONOURS, FELLOWSHIPS AND AWARDS

Member, Quantum Materials Program, Canadian Institute for Advanced Research, 2000–2019. (a.k.a. Quantum Matter Program, Superconductivity Program)

SFU Dean of Graduate Studies Awards for Leadership, 2013.

Awarded to “individuals who have made significant contributions to leadership in graduate student development and the graduate student enterprise at SFU.”

Cottrell Scholar Award, Research Corporation, 2003–6.

A. P. Sloan Research Fellowship, 2001–2.

ARCS Foundation Scholar, 1995.

John and Fannie Hertz Foundation Scholar, 1985–1989.

PUBLICATIONS

Trainees in my research group are underlined.

Peer-reviewed

L. Mohtashemi, P. Westlund, D. G. Sahota, G. B. Lea, I. Bushfield, P. Mousavi, J. S. Dodge, Maximum-likelihood parameter estimation in terahertz time-domain spectroscopy, *Opt. Express*, **29**, 4912 (2021). (Included in OSA *Spotlight on Optics*) [DOI](#)

- D. G. Sahota, R. Liang, M. Dion, P. Fournier, H. A. Dabkowska, G. M. Luke, J. S. Dodge, Many-body recombination in photoexcited insulating cuprates, *Phys. Rev. Research* **1**, 033214 (2019). [DOI](#)
- J. C. Petersen, A. D. Farahani, D. G. Sahota, R. Liang, J. S. Dodge, Transient terahertz photoconductivity of insulating cuprates, *Phys. Rev. B* **96**, 115133 (2017). [DOI](#)
- N. R. Lee-Hone, J. S. Dodge, and D. M. Broun, Disorder and superfluid density in overdoped cuprate superconductors, *Phys. Rev. B* **96**, 024501 (2017). (Physical Review Editor's Suggestion) [DOI](#)
- S. Patankar, J. P. Hinton, J. Griesmar, J. Orenstein, J. S. Dodge, X. Kou, L. Pan, K. L. Wang, A. J. Bestwick, E. J. Fox, D. Goldhaber-Gordon, J. Wang, and S.-C. Zhang, Resonant magneto-optic Kerr effect in the magnetic topological insulator $\text{Cr}(\text{Sb}_x\text{Bi}_{1-x})_2\text{Te}_3$, *Phys. Rev. B* **92**, 214440 (2015). [DOI](#)
- J. Orenstein and J. S. Dodge, Terahertz time-domain spectroscopy of transient metallic and superconducting states, *Phys. Rev. B* **92**, 134507 (2015). (Physical Review Editor's Suggestion) [DOI](#)
- G. Koster, L. Klein, W. Siemons, G. Rijnders, J. S. Dodge, C.-B. Eom, D. H. A. Blank, and M. R. Beasley, Structure, physical properties, and applications of SrRuO_3 thin films, *Rev. Mod. Phys.* **84**, 253 (2012). [DOI](#)
- S. Savard, J.-F. Allard, M. Bernier, J. C. Petersen, J. S. Dodge, P. Fournier, and D. Morris, Photoexcited carrier relaxation dynamics and terahertz response of photoconductive antennas made on proton bombarded GaAs materials, *J. Appl. Phys.* **108**, 124507 (2010). [DOI](#)
- P. Mousavi, F. Haran, D. Jez, F. Santosa, and J. S. Dodge, Simultaneous composition and thickness measurement of paper using terahertz time-domain spectroscopy, *Appl. Opt.* **48**, 6541 (2009). [DOI](#)
- S. Kamal, D. M. Kim, C. B. Eom and J. S. Dodge, Terahertz-frequency carrier dynamics and spectral weight redistribution in the nearly magnetic metal CaRuO_3 , *Phys. Rev. B* **74**, 165115 (2006). [DOI](#)
- J. C. Petersen, M. D. Caswell, I. A. Sergienko, J. He, R. Jin, D. Mandrus, and J. S. Dodge, Nonlinear optical signatures of the tensor order in $\text{Cd}_2\text{Re}_2\text{O}_7$, *Nat. Phys.* **2**, 605 (2006). [DOI](#)
- M. A. Gilmore, S. Kamal, D. M. Broun, and J. S. Dodge, Determination of electron-phonon interaction parameters from time-domain terahertz spectroscopy, *Appl. Phys. Lett.* **88**, 141910 (2006). [DOI](#)
- A. B. Schumacher, J. S. Dodge, M. A. Carnahan, R. A. Kaindl, D. S. Chemla, and L. L. Miller, Parity-Forbidden Excitations of $\text{Sr}_2\text{CuO}_2\text{Cl}_2$ Revealed by Optical Third-Harmonic Spectroscopy, *Phys. Rev. Lett.* **87**, 127006 (2001). [DOI](#)
- R. Löwenich, A. B. Schumacher, J. S. Dodge, D. S. Chemla, and L. L. Miller, Evidence of phonon mediated coupling between charge transfer and ligand field excitons in $\text{Sr}_2\text{CuO}_2\text{Cl}_2$, *Phys. Rev. B* **63**, 235104 (2001). [DOI](#)
- J. S. Dodge, C. P. Weber, J. Corson, J. Orenstein, Z. Schlesinger, J. Reiner, and M. R. Beasley, Low-Frequency Crossover of the Fractional Power-Law Conductivity in SrRuO_3 , *Phys. Rev. Lett.* **85**, 4392 (2000). [DOI](#)
- L. Klein, J. S. Dodge, T. H. Geballe, M. R. Beasley, and A. Kapitulnik, Reply to: 'Resistive anomalies at ferromagnetic transitions revisited: the case of SrRuO_3 ', *Phys. Rev. Lett.* **84**, 2280 (2000). [DOI](#)
- J. S. Dodge, A. B. Schumacher, J.-Y. Bigot, D. S. Chemla, N. Ingle, and M. R. Beasley, Time-Resolved Optical Observation of Spin-Wave Dynamics, *Phys. Rev. Lett.* **83**, 4650 (1999). [DOI](#)
- J. S. Dodge, E. Kulatov, L. Klein, C. H. Ahn, J. W. Reiner, T. H. Geballe, M. R. Beasley, A. Kapitulnik, H. Ohta, Yu. Uspenskii, and S. Halilov, Temperature-dependent local exchange splitting in SrRuO_3 , *Phys. Rev. B* **60**, R6987 (1999). [DOI](#)
- A. F. Marshall, L. Klein, J. S. Dodge, C. H. Ahn, J. W. Reiner, L. Mieville, L. Antognazza, A. Kapitulnik, T. H. Geballe, and M. R. Beasley, Lorentz transmission electron microscope study of ferromagnetic domain walls in SrRuO_3 : Statics, dynamics, and crystal structure correlation, *J. Appl. Phys.* **85**, 4131 (1999). [DOI](#)
- L. Klein, J. S. Dodge, C. H. Ahn, J. W. Reiner, L. Mieville, T. H. Geballe, M. R. Beasley, and A. Kapitulnik,

Transport and magnetization in the badly metallic itinerant ferromagnet SrRuO_3 , *J. Phys.: Condens. Matter* **8**, 10111 (1996). DOI

L. Klein, J. S. Dodge, C. H. Ahn, G. J. Snyder, T. H. Geballe, M. R. Beasley, and A. Kapitulnik, Anomalous spin scattering effects in the badly metallic itinerant ferromagnet SrRuO_3 , *Phys. Rev. Lett.* **77**, 2774 (1996). DOI

J. S. Dodge, L. Klein, Paul. R. Johnson, M. M. Fejer and A. Kapitulnik, Symmetry and the magneto-optic response of the Sagnac interferometer, *J. Appl. Phys.* **79**, 6186 (1996). DOI

L. Klein, J. S. Dodge, T. H. Geballe, A. Kapitulnik, A. F. Marshall, L. Antognazza, and K. Char. Perpendicular magnetic anisotropy and strong magneto-optic properties of SrRuO_3 epitaxial films, *Appl. Phys. Lett.* **66**, 2427 (1995). DOI

J. S. Dodge, M. M. Fejer and A. Kapitulnik, Magneto-optic measurements with a Sagnac interferometer, *Ferroelectrics* **162**, 735 (1994). DOI

S. Spielman, J. S. Dodge, L. W. Lombardo, C. B. Eom, M. M. Fejer, T. H. Geballe, and A. Kapitulnik, Measurement of the spontaneous polar Kerr effect in $\text{YBa}_2\text{Cu}_3\text{O}_7$ and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$, *Phys. Rev. Lett.* **68**, 3472 (1992). DOI

S. Spielman, J. S. Dodge, K. Fesler, L. W. Lombardo, M. M. Fejer, T. H. Geballe, and A. Kapitulnik, Test for non-reciprocal circular birefringence in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$, *Phys. Rev. B* **45**, 3149 (1992). DOI

Refereed conference proceedings

P. Mousavi, I. R. Bushfield, S. Savard, F. Haran, and J. S. Dodge, Paper Parameter Estimation Using Time-Domain Terahertz Spectroscopy, in *Conference on Lasers and Electro-Optics 2012*, OSA Technical Digest (online) (Optical Society of America, 2012), paper AW1H.6. DOI

J. S. Dodge, A. B. Schumacher, L. L. Miller, and D. S. Chemla, Time-resolved spectroscopy of the charge-transfer gap in $\text{Sr}_2\text{CuO}_2\text{Cl}_2$, in *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference and Photonic Applications Systems Technologies*, OSA Technical Digest (CD) (Optical Society of America, 2008), paper QThC4.

J. S. Dodge, A. B. Schumacher, L. L. Miller, and D. S. Chemla, Time-resolved spectroscopy of the charge-transfer gap in $\text{Sr}_2\text{CuO}_2\text{Cl}_2$, in *Frontiers in Optics 2007/Laser Science XXIII/Organic Materials and Devices for Displays and Energy Conversion*, OSA Technical Digest (CD) (Optical Society of America, 2007), paper LThE5.

J. S. Dodge, S. Kamal, D. Sahota, and M. A. Gilmore, Metallic Electron-Boson Interaction Parameters Determined with Time-Domain Terahertz Spectroscopy, in *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference and Photonic Applications Systems Technologies*, Technical Digest (CD) (Optical Society of America, 2006), paper CMCC4.

S. Kamal, J. S. Dodge, D. Kim, and C. B. Eom, Low Frequency Conductivity Scaling in CaRuO_3 , in *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science and Photonic Applications Systems Technologies*, Technical Digest (CD) (Optical Society of America, 2005), paper QWC2.

J. S. Dodge, A. B. Schumacher, R. Lovenich, M. A. Carnahan, R. A. Kaindl, L. L. Miller, and D. S. Chemla, Linear and nonlinear optics of $\text{Sr}_2\text{CuO}_2\text{Cl}_2$, *Physica B* **312-313**, 909 (2002). International Conference on Strongly Correlated Electron Systems (SCES 2001), Invited. DOI

M. A. Carnahan, A. B. Schumacher, J. S. Dodge, R. A. Kaindl, D. S. Chemla, and L. L. Miller, Third harmonic generation at the charge transfer gap in $\text{Sr}_2\text{CuO}_2\text{Cl}_2$, in *Quantum Electronics and Laser Science Conference*, G. Agrawal, Y. Yamamoto, T. Norris, and J. Thomas, eds., OSA Technical Digest (Optical Society of America, 2001), paper QME3.

J. S. Dodge, A. B. Schumacher, J.-Y. Bigot, D. S. Chemla, N. Ingle, and M. R. Beasley, Time-resolved observation of magnon renormalization effects in Cr_2O_3 , in *Quantum Electronics and Laser Science Conference*, P. Bucksbaum, R. Falcone, G. Agrawal, and Y. Yamamoto, eds., OSA Technical Digest (Optical Society of America, 1999), paper QThH1.

J. S. Dodge, J. Corson, R. Mallozzi, J. Orenstein, J. Reiner, and M. R. Beasley, Electron-magnon renormalization effects in SrRuO_3 , in *Quantum Electronics and Laser Science Conference*, P. Bucksbaum, R. Falcone, G. Agrawal, and Y. Yamamoto, eds., OSA Technical Digest (Optical Society of America, 1999), paper QThG14.

J. S. Dodge, J. Corson, J. W. Reiner, M. R. Beasley, and J. Orenstein, Terahertz time-domain observation of scattering rate renormalization in SrRuO_3 , *Magnetoresistive Oxides and Related Materials*, Proceedings of Symposium JJ, 1999 Fall Materials Research Society Meeting, M. Rzechowski, M. Kawasaki, A. J. Millis, M. Rajeswari, and S. von Molnár, ed.

A. Kapitulnik, M. M. Fejer and J. S. Dodge, High-resolution magneto-optic measurements with a Sagnac interferometer, *J. Appl. Phys.* **75**, 6872 (1994). 38th Annual Conference on Magnetism and Magnetic Materials (MMM 93), Invited. [DOI](#)

S. Doniach, A. Kapitulnik, P. Frank, M. M. Fejer, S. Spielman, and J. S. Dodge, Time reversal symmetry breaking in biological molecules, in *Physical Phenomena at High Magnetic Fields: Proceedings*, E. Manousakis, et al., ed. (Addison-Wesley, Redwood City, 1992), pp. 452–7.

Other publications

J. S. Dodge, Lasers expose hidden electronic order, *Science* **356**, 246 (2017). (Invited Perspective) [DOI](#)

PATENTS

Trainees in my research group are underlined.

Payam Mousavi, Steven Dodge, Frank Martin Haran, Stephane Savard, David Jez, and Stuart James Heath, Continuous Referencing for Increasing Measurement Precision in Time-Domain Spectroscopy, US 8,378,304, 19 February 2013. [USPTO](#)

Frank Martin Haran, Payam Mousavi, David Jez and J. Steven Dodge, Time domain spectroscopy (TDS)-based method and system for obtaining coincident sheet material parameters, US 8,187,424, 29 May 2012. [USPTO](#)

INVITED RESEARCH PRESENTATIONS

International conferences

Quantum Materials Program, Canadian Institute for Advanced Research (CIFAR), Spring Meeting. Vancouver, BC, April 2019.

Stanford & SLAC Ultrafast Materials Science Workshop. Stanford, CA, May 2017. (Session chair overview)

Quantum Materials Program, Canadian Institute for Advanced Research (CIFAR), 2017 Summer School. Vancouver, BC, May 2017.

Oxide-based Materials and Devices VIII (SPIE). San Francisco, CA, January 2017.

International Symposium on Optomechatronic Technologies. Seattle, WA, November 2014.

Applied Industrial Optics: Spectroscopy, Imaging, and Metrology (AIO). Seattle, WA, July 2014.

Quantum Materials Program, Canadian Institute for Advanced Research (CIFAR), 2011 Summer School. Vancouver, BC, May 2011.

Quantum Materials Program, Canadian Institute for Advanced Research (CIFAR), Fall Meeting. Carling Lake, QC, November 2007.

March Meeting of the American Physical Society. Denver, CO, March 2007.

Optical Society of America Laser Science Conference. Orlando, FL, September 2002.

KITP Program on Realistic Theories of Correlated Electron Materials. Santa Barbara, CA, August 2002.
 Strongly Correlated Electron Systems 2001. Ann Arbor, MI, August 2001.
 Aspen Center for Physics, Summer Workshop on Emergent Phenomena in Correlated Electron Systems. Aspen, CO, July 2001.
 Superconductivity Program, Canadian Institute for Advanced Research (CIAR). QC, May 2001.
 Materials Research Society, Fall Meeting. Boston, MA, November 2000.
 Gordon Conference on Correlated Electron Systems. Plymouth, NH, June 2000.
 March Meeting of the American Physical Society. Minneapolis, MN, March 2000.
 American Chemical Society Fall National Meeting. New Orleans, LA, August 1999.
 Quantum Electronics and Laser Science Conference. Baltimore, MD, May 1999.
 International Conference on Magnetoelectric Phenomena in Crystals. Ascona, Switzerland, September 1993.

National conferences

Advanced Laser Light Source Workshop. Online, March 2021.
 Quantum Materials Canada, Virtual Seminar Series. Online, December 2020.
 TRIUMF Accelerator Science Workshop. Vancouver, BC, July 2017.
 Canadian Association of Physicists (CAP) Congress. Sudbury, ON, June 2014.
 Canadian Association of Physicists (CAP) Congress. Calgary, AB, June 2012.
 Canadian Association of Physicists (CAP) Congress. Saskatoon, SK, June 2007.

Regional conferences

Spin and Charge at the Nanoscale. Burnaby, BC, July 2007.
 Northwest Section Conference of the American Physical Society. Tacoma, WA, May 2006.
 Pacific Centre for Materials and Microstructures (PCAMM), Annual Meeting. Vancouver, BC, December 2005.
 Northwest Section Conference of the American Physical Society. Banff, AB, May 2002.

Colloquia and seminars

Misty West, Special Seminar. Vancouver, BC, July 2019.
 Stanford University, Condensed Matter Seminar. Stanford, CA, April 2014.
 Université de Montréal, Condensed Matter Seminar. Montreal, QC, January 2013.
 Université de Sherbrooke, Condensed Matter Seminar. Sherbrooke, QC, January 2013.
 McGill University, Condensed Matter Seminar. Montreal, QC, October 2012.
 University of Alberta, Condensed Matter Seminar. Alberta, AB, July 2012.
 Oak Ridge National Laboratory Seminar. Oak Ridge, TN, May 2007.
 University of British Columbia, Condensed Matter Seminar. Vancouver, BC, March 2007.
 Honeywell Automation & Control Solutions Industry Solutions, Pulp, Paper and Printing, Special Seminar. North Vancouver, BC, November 2006.
 Stanford University, Condensed Matter Seminar. Stanford, CA, May 2006.

University of Washington Condensed Matter and Atomic Physics Seminar. Seattle, WA, April 2006.
University of British Columbia, Physical Chemistry Seminar. Vancouver, BC, March 2006.
University of California, Santa Cruz, Condensed Matter Seminar. Santa Cruz, CA, May 1999.
John Hopkins University, Condensed Matter Seminar. Baltimore, MD, December 1998.
University of California, San Diego, Condensed Matter Seminar. San Diego, MD, September 1998.

Invited presentations by students

L. Mohtashemi, D-Wave Systems, Special Seminar. Burnaby, BC, October, 2016.
P. Mousavi, Point Grey Research, Special Seminar. Richmond, BC, July 2013.
J. C. Petersen, Oxford University, Seminar. Oxford, UK, May 2008.
J. C. Petersen, Simon Fraser University, Condensed Matter Seminar. Burnaby, BC, March 2007.

Public outreach

SFU Art Gallery, Fabricating Meaning, a discussion with Eldon Yellowhorn on the work of Ann Beam and Carl Beam, April 2019.
SFU Art Gallery, Unpacking Art, a presentation of scientific ideas related to Evan Lee's *Stain II*, December 2017.
SFU Art Gallery, Geometry of Knowing, panel discussion on the physics, chemistry and politics of CO₂ with Kika Thorne, Am Johal, and Vance Williams, March 2015.
Centre for Sustainable Food Systems, UBC Farm, Clean Energy from Fusion, panel discussion with Meeru Dhalwala, Howard Trottier, and Michel Laberge, December 2014
An Exploration of Light, appearance in a short documentary film by Rami Katz, 2013. ([URL](#))