

# Samuel Jacobi Grauer

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CONTACT INFORMATION	232 Research East Building Pennsylvania State University University Park, PA 16802	<i>Phone</i> 814-863-6289 <i>Email</i> <a href="mailto:sgrauer@psu.edu">sgrauer@psu.edu</a> <i>Web</i> <a href="http://samgrauer.ca">samgrauer.ca</a>
EDUCATION	<b>University of Waterloo</b> PhD, Mechanical and Mechatronics Engineering <ul style="list-style-type: none"><li>• Thesis: <a href="#">Bayesian methods for gas-phase tomography</a></li><li>• Advisor: Kyle J Daun</li></ul> <b>University of Manitoba</b> BSc, Mechanical Engineering <ul style="list-style-type: none"><li>• Thesis: Development of correlations for laminar film condensation in a non-condensing gas</li><li>• Advisor: Scott J Ormiston</li></ul>	Waterloo, Canada September 10, 2018  Winnipeg, Canada June 3, 2014
APPOINTMENTS	<b>Pennsylvania State University</b> Assistant Professor, Department of Mechanical Engineering Faculty Fellow, Institute for Computational and Data Sciences  <b>Friedrich-Alexander-Universität Erlangen-Nürnberg</b> Guest Professor, Erlangen Graduate School in Advanced Optical Technologies	University Park, PA 2021–Present 2021–Present  Erlangen, Germany 2022–Present
RESEARCH EXPERIENCE	<b>Georgia Institute of Technology</b> <i>Postdoctoral Fellow</i> , Ben T. Zinn Combustion Laboratory  <b>University of Waterloo</b> <i>Undergraduate Research Assistant</i>  <b>Atomic Energy of Canada Limited</b> <i>Undergraduate Research Assistant</i> , Fuel & Fuel Channel Safety Branch	Atlanta, GA 2018–2020  Waterloo, Canada Summer 2013  Chalk River, Canada Summer 2012
AWARDS & SCHOLARSHIPS	Emerging Leader in Measurement and Metrology Editorial Board, Measurement Science and Technology, Institute of Physics (IOP)  SAOT Young Researcher Award (YRA) in Advanced Optical Technologies Erlangen Graduate School in Advanced Optical Technologies (SAOT)  Postdoctoral Fellowship (PDF) Natural Sciences and Engineering Research Council of Canada (NSERC)  Postgraduate Scholarships–Doctoral Program (PGS D3) Natural Sciences and Engineering Research Council of Canada (NSERC)  President’s Graduate Scholarship University of Waterloo	March 2023  2022–2026 EUR 100k  2018–2020 CAD 90k  2016–2018 CAD 63k  2016–2018 CAD 30k

RESEARCH  
FUNDING

<b>STTR: Phase II Fast and Robust Algorithms and Software for Limited-Data Computed Tomography</b> Sponsor: <i>DEVCOM Army Research Laboratory</i> Prime: <i>Spectral Energies, LLC</i> (PI: KD Rein) Role: <i>Principal Investigator</i>	10/2023–9/2025 Award total: \$1,150k Allocation: \$400k
<b>Developing a Generalized Empirical Model for Flame Transfer Functions Using Multi-Fidelity Data from Experiments and Numerical Simulations</b> Sponsor: <i>Solar Turbines Incorporated</i> Role: <i>Co-Principal Investigator</i> (PI: Y Xuan)	5/2023–4/2025 Award total: \$243k Allocation: –
<b>Uncertainty Quantification Framework for Gas Turbine Digital Twins</b> Sponsor: <i>Solar Turbines Incorporated</i> Role: <i>Principal Investigator</i>	1/2023–12/2023 Award total: \$100k
<b>STTR: Phase I Fast and Robust Algorithms and Software for Limited-Data Computed Tomography</b> Sponsor: <i>DEVCOM Army Research Laboratory</i> Prime: <i>Spectral Energies, LLC</i> (PI: KD Rein) Role: <i>Principal Investigator</i>	8/2022–7/2023 Award total: \$175k Allocation: \$75k
<b>Collaborative Research: Physics-Informed Background-Oriented Schlieren Tomography of Wildfire-Relevant Combustion</b> Sponsor: <i>National Science Foundation</i> Role: <i>Principal Investigator</i> (Co-PIs: BE Schmidt, YTT Liao)	10/2022–9/2025 Award total: \$526k Allocation: \$284.5k
<b>SBIR: Phase I Multiparameter Laser Absorption Tomography System for High-Speed Flows</b> Sponsor: <i>National Aeronautics and Space Administration</i> Prime: <i>Innovative Scientific Solutions, Inc.</i> (PI: BA Ochs) Role: <i>Principal Investigator</i>	8/2022–7/2023 Award total: \$150k Allocation: \$44.5k
<b>LDRD: Ultra-High-Speed X-Ray Tomography: Bridging the Gaps to See the Unknown</b> Sponsor: <i>Sandia National Laboratories</i> (PI: BR Halls) Role: <i>Principal Investigator</i>	1/2022–12/2024 Award total: \$1,800k Allocation: \$300k
<b>3D Signal Inversion and Optimization Framework for Multi-Beam LAS in a High-Speed Inlet</b> Sponsor: <i>Air Force Research Laboratory</i> Prime: <i>Innovative Scientific Solutions, Inc.</i> (PI: BA Ochs) Role: <i>Principal Investigator</i>	9/2021–8/2022 Award total: \$43.5k
<b>Design-of-Experiment Framework for Multi-Modal Measurements Applied to a High-Speed Inlet</b> Sponsor: <i>Air Force Research Laboratory</i> Prime: <i>Innovative Scientific Solutions, Inc.</i> (PI: BA Ochs) Role: <i>Co-Principal Investigator</i> (PI: AM Steinberg)	9/2019–8/2020 Award total: \$75.5k Allocation: –

## TEACHING

Role	Course	Institution	Term
Inst.	Computational Tools (ME 330)	Penn State	Fall 2023
Inst.	Computational Tools (ME 330)	Penn State	Spring 2023
Inst.	Computational Tools (ME 330)	Penn State	Fall 2022
Inst.	Computational Tools (ME 330)	Penn State	Spring 2022
Inst.	Computational Tools (ME 330)	Penn State	Fall 2021
Inst.	Computational Tools (ME 330)	Penn State	Spring 2021
TA	Ordinary Differential Equations (ME 203)	University of Waterloo	Spring 2017
TA	Ordinary Differential Equations (MTE 202)	University of Waterloo	Winter 2017
TA	Heat Transfer II (ME 456)	University of Waterloo	Fall 2016
TA	Heat Transfer I (ME 353)	University of Waterloo	Fall 2016
TA	Thermodynamics and Heat Transfer (ECE 309)	University of Waterloo	Spring 2016
TA	Technology, Society, and the Future (CIVL 4460)	University of Manitoba	Winter 2014

## BOOK CHAPTERS

- B3. **SJ Grauer**, TA Sipkens, PJ Hadwin, KJ Daun, “Statistical inversion, uncertainty quantification, and the optimal design of optical experiments,” in *Optical Diagnostics for Reacting and Non-Reacting Flows: Theory and Practice*, A Steinberg and S Roy, eds., 1st ed. (AIAA, 2023), 1137–1202. doi:10.2514/5.9781624106330.1137.1202
- B2. BR Halls, TR Meyer, **SJ Grauer**, L Ma, “Tutorial: Tomographic imaging in combustion-related flows,” in *Optical Diagnostics for Reacting and Non-Reacting Flows: Theory and Practice*, A Steinberg and S Roy, eds., 1st ed. (AIAA, 2023), 1089–1136. doi:10.2514/5.9781624106330.1089.1136
- B1. H McCann, P Wright, K Daun, **SJ Grauer**, C Liu, S Wagner, “Chemical species tomography,” in *Industrial Tomography: Systems and Applications*, M Wang, ed., 2nd ed. (Woodhead Publishing, 2022), 155–206. doi:10.1016/B978-0-12-823015-2.00004-2

## INTELLECTUAL PROPERTY

- P1. **SJ Grauer**, K Zhou\*, JP Molnar, and J Hong, “System and method for fluid flow assessment,” U.S. provisional patent application 63/426,893 (Nov. 21, 2022).

## JOURNAL PUBLICATIONS

**Published**

- J25. FJ Bauer<sup>†</sup>, PAB Braeuer<sup>†</sup>, MWR Wilke, S Will, and **SJ Grauer**, “2D *in situ* determination of soot optical band gaps in flames using hyperspectral absorption tomography,” *Combust. Flame* (In Press), 112730, 2023. doi:10.1016/j.combustflame.2023.112730
- J24. K Zhou, J Li, J Hong, and **SJ Grauer**, “Stochastic particle advection velocimetry (SPAV): theory, simulations, and proof-of-concept experiments,” *Meas. Sci. Technol.* **34**, 065302, 2023. doi:10.1088/1361-6501/acc049
- J23. JP Molnar, L Venkatakrisnan, BE Schmidt, TA Sipkens, and **SJ Grauer**, “Estimating density, velocity, and pressure fields in supersonic flows using physics-informed BOS,” *Exp. Fluids* **64**, 14, 2023. doi:10.1007/s00348-022-03554-y
- J22. TA Sipkens, JC Corbin, **SJ Grauer**, and GJ Smallwood, “Tutorial: Guide to error propagation for particle counting measurements,” *J. Aerosol Sci.* **167**, 106091, 2023. doi:10.1016/j.jaerosci.2022.106091
- J21. **SJ Grauer**<sup>†</sup>, K Mohri<sup>†</sup>, T Yu, H Liu, and W Cai, “Volumetric emission tomography for combustion processes,” *Prog. Energy Combust. Sci.* **94**, 101024, 2023. doi:10.1016/j.pecs.2022.101024

\*Underline indicates a student who was supervised by me.

<sup>†</sup>Authors made an equal contribution.

- J20. **SJ Grauer**, KM Rice, JM Donbar, NJ Bisek, JJ France, BA Ochs, and AM Steinberg, “Optimization of tunable diode laser arrays for inlet mass capture measurement,” *AIAA J.* **60**(10), 5854–5867, 2022. doi:10.2514/1.J061774.
- J19. JP Molnar and **SJ Grauer**, “Flow field tomography with uncertainty quantification using a Bayesian physics-informed neural network,” *Meas. Sci. Technol.* **33**(6), 065305, 2022.<sup>‡</sup> doi:10.1088/1361-6501/ac5437
- J18. M Gomez, **SJ Grauer**, J Ludwigsen, AM Steinberg, SF Son, S Roy, and TR Meyer, “Megahertz-rate background-oriented schlieren tomography in post-detonation blasts,” *Appl. Opt.* **61**(10), 2444–2458, 2022. doi:10.1364/AO.449654
- J17. TA Sipkens, **SJ Grauer**, AM Steinberg, SN Rogak, and P Kirchen, “New transform to project axisymmetric deflection fields along arbitrary rays,” *Meas. Sci. Technol.* **33**(3), 035201, 2022. doi:10.1088/1361-6501/ac3f83
- J16. NP Brown, **SJ Grauer**, JA Deibel, MLR Walker, and AM Steinberg, “Bayesian framework for THz-TDS plasma diagnostics,” *Opt. Express* **29**(4), 4887–4901, 2021. doi:10.1364/OE.417396
- J15. **SJ Grauer** and AM Steinberg, “Linear absorption tomography with velocimetry (LATV) for multiparameter measurements in high-speed flows,” *Opt. Express* **28**(22), 32676–32692, 2020. doi:10.1364/OE.408588
- J14. RB Miguel, J Emmert, **SJ Grauer**, J Thornock, and KJ Daun, “Optimal filter selection for quantitative gas mixture imaging,” *J. Quant. Spectrosc. Radiat. Transfer* **254**, 107208, 2020. doi:10.1016/j.jqsrt.2020.107208
- J13. **SJ Grauer** and AM Steinberg, “Fast and robust volumetric refractive index measurement by unified background-oriented schlieren tomography,” *Exp. Fluids* **61**(3), 80, 2020. doi:10.1007/s00348-020-2912-1
- J12. J Emmert, **SJ Grauer**, S Wagner, and KJ Daun, “Efficient Bayesian inference of absorbance spectra from transmitted intensity spectra,” *Opt. Express* **27**(19), 26893–26909, 2019. doi:10.1364/OE.27.026893
- J11. **SJ Grauer**<sup>†</sup>, J Emmert<sup>†</sup>, ST Sanders, S Wagner, and KJ Daun, “Multiparameter gas sensing with linear hyperspectral absorption tomography,” *Meas. Sci. Technol.* **30**(10), 105401, 2019. doi:10.1088/1361-6501/ab274b
- J10. **SJ Grauer**, A Unterberger, A Rittler, KJ Daun, AM Kempf, and K Mohri, “Instantaneous 3D flame imaging by background-oriented schlieren tomography,” *Combust. Flame* **196**, 284–299, 2018. doi:10.1016/j.combustflame.2018.06.022
- J9. TA Sipkens, PJ Hadwin, **SJ Grauer**, and KJ Daun, “Predicting the heat of vaporization of iron at high temperatures using time-resolved laser-induced incandescence and Bayesian model selection,” *J. Appl. Phys.* **123**(9), 095103, 2018. doi:10.1063/1.5016341
- J8. **SJ Grauer**, BC Conrad, RB Miguel, and KJ Daun, “Gaussian model for emission rate measurement of a heated plume using hyperspectral data,” *J. Quant. Spectrosc. Radiat. Transfer* **206**, 125–134, 2018. doi:10.1016/j.jqsrt.2017.11.005
- J7. TA Sipkens, PJ Hadwin, **SJ Grauer**, and KJ Daun, “General error model for analysis of laser-induced incandescence signals,” *Appl. Opt.* **56**(30), 8436–8445, 2017. doi:10.1364/AO.56.008436
- J6. **SJ Grauer**, PJ Hadwin, TA Sipkens, KJ Daun, “Measurement-based meshing, basis selection, and prior assignment in chemical species tomography,” *Opt. Express* **25**(21), 25135–2514, 2017. doi:10.1364/OE.25.025135
- J5. **SJ Grauer**, RW Tsang, and KJ Daun, “Broadband chemical species tomography: Measurement theory and a proof-of-concept emission detection experiment,” *J. Quant. Spectrosc. Radiat. Transfer* **198**, 145–154, 2017. doi:10.1016/j.jqsrt.2017.04.030

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<sup>‡</sup>Paper featured on the journal issue cover.

- J4. **SJ Grauer**, PJ Hadwin, and KJ Daun, “Improving chemical species tomography of turbulent flows using covariance estimation,” *Appl. Opt.* **56**(13), 3900–3912, 2017. doi:10.1364/AO.56.003900
- J3. **SJ Grauer**, PJ Hadwin, and KJ Daun, “Bayesian approach to the design of chemical species tomography experiments,” *Appl. Opt.* **55**(21), 5772–5782, 2016. doi:10.1364/AO.55.005772
- J2. KJ Daun, **SJ Grauer**, and PJ Hadwin, “Chemical species tomography of turbulent flows: Discrete ill-posed and rank deficient problems and the use of prior information,” *J. Quant. Spectrosc. Radiat. Transfer* **172**, 58–74, 2016. doi:10.1016/j.jqsrt.2015.09.011
- J1. **SJ Grauer**, EJFR Caron, NL Chester, MA Wells, and KJ Daun, “Investigation of melting in the Al–Si coating of a boron steel sheet by differential scanning calorimetry,” *J. Mater. Process. Technol.* **216**, 89–94, 2015. doi:10.1016/j.jmatprotec.2014.09.001

### Submitted

- S1. JL Suazo Betancourt, **SJ Grauer**, J Bak, AM Steinberg, and MLR Walker, “Bayesian model selection for Thomson scattering,” *Rev. Sci. Instrum.* (Submitted).

REFEREED  
CONFERENCE  
CONTRIBUTIONS

### Papers

- C37. FJ Bauer, PAB Braeuer, MWR Wilke, SR Faderl, **SJ Grauer**, and S Will, “Broadband extinction and Raman spectroscopy measurements to investigate optical properties of soot particles in premixed flames,” *11th European Combustion Meeting*, Rouen, France, Apr. 26–28, 2023 (6 pp).
- C36. N Schmidt, PAB Braeuer, **SJ Grauer**, FJ Bauer, and S Will, “NIR-emission spectroscopy for local temperature measurements in premixed hydrogen/air flames,” *11th European Combustion Meeting*, Rouen, France, Apr. 26–28, 2023 (6 pp).
- C35. JP Molnar, **SJ Grauer**, O Léon, D Donjat, and F Nicolas, “Physics-informed background-oriented schlieren of turbulent underexpanded jets,” *AIAA SciTech 2023 Forum*, National Harbor, MD & Online, Jan. 23–27, 2023 (15 pp). doi:10.2514/6.2023-2441
- C34. **SJ Grauer**, AM Steinberg, KM Rice, JM Donbar, NJ Bisek, JJ France, and BA Ochs, “Bayesian optimization of a TDLAS array for mass capture measurement,” *AIAA SciTech 2021 Forum*, Virtual Event, Jan. 11–15 & 19–21, 2021 (16 pp). doi:10.2514/6.2021-0721
- C33. **SJ Grauer**, J Emmert, AM Steinberg, S Wagner, and KJ Daun, “Hyperspectral absorption tomography with a lineshape prior,” *11th US National Combustion Meeting*, Pasadena, CA, Mar. 24–27, 2019 (10 pp).
- C32. **SJ Grauer**, A Unterberger, KJ Daun, and K Mohri, “Demonstration of instantaneous 3D flame reconstruction by background-oriented schlieren tomography,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Toronto, Canada, May 14–17, 2018 (6 pp).
- C31. RB Miguel, **SJ Grauer**, TA Sipkens, and KJ Daun, “Optical measurement of hydrocarbon gas mixtures using MWIR broadband cameras,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Toronto, Canada, May 14–17, 2018 (6 pp).
- C30. TA Sipkens, PJ Hadwin, **SJ Grauer**, and KJ Daun, “Using Bayesian model selection and time-resolved laser-induced incandescence to probe the sublimation properties of soot,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Toronto, Canada, May 14–17, 2018 (6 pp).
- C29. **SJ Grauer**, PJ Hadwin, and KJ Daun, “Chemical species tomography with self-similar covariance as hierarchical Bayesian inference,” *9th International Conference on Inverse Problems in Engineering*, Waterloo, Canada, May 23–26, 2017 (8 pp).
- C28. TA Sipkens, PJ Hadwin, **SJ Grauer**, and KJ Daun, “Applying model selection to laser-induced incandescence,” *9th International Conference on Inverse Problems in Engineering*, Waterloo, Canada, May 23–26, 2017 (16 pp).

- C27. **SJ Grauer**, BM Conrad, RB Miguel, and KJ Daun, “Assessment of a novel optical diagnostic to quantify emissions from a heated methane plume,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Montreal, Canada, May 15–18, 2017 (6 pp).
- C26. RW Tsang, **SJ Grauer**, and KJ Daun, “Development, calibration, and testing of a tomographic open-path hydrocarbon detection system,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Waterloo, Canada, May 10–12, 2016 (6 pp).
- C25. **SJ Grauer**, PJ Hadwin, and KJ Daun, “An analysis of prior information in Bayesian tomographic reconstruction,” *1st Thermal Fluids Engineering Summer Conference*, New York, NY, Aug. 9–12, 2015 (11 pp). doi:10.1615/TFESC1.cmd.012901
- C24. RW Tsang, **SJ Grauer**, and KJ Daun, “Development of an open-path hydrocarbon detector for tomographic mass flux estimation,” *Combustion Institute/Canadian Section Spring Technical Meeting*, Saskatoon, Canada, May 11–14, 2015 (7 pp).

### Abstracts

- C23. JP Molnar, **SJ Grauer**, JJ France, BA Ochs, JM Donbar “Time-resolved WMS tomography with velocimetry for high-enthalpy flows,” *76th Annual Meeting of the APS Division of Fluid Dynamics*, Washington, DC, Nov. 19–21, 2023.
- C22. K Zhou and **SJ Grauer**, “Reconstructing complex flows from inertial Lagrangian particle tracks,” *76th Annual Meeting of the APS Division of Fluid Dynamics*, Washington, DC, Nov. 19–21, 2023.
- C21. AK Singh, JP Molnar, **SJ Grauer**, and GS Sidharth, “Aggregate loss data assimilation (ALDA) for supersonic BOS,” *75th Annual Meeting of the APS Division of Fluid Dynamics*, Indianapolis, IN, Nov. 20–22, 2022.
- C20. K Zhou, **SJ Grauer**, and J Hong, “4D DIH-PTV via stochastic particle advection velocimetry (SPAV),” *75th Annual Meeting of the APS Division of Fluid Dynamics*, Indianapolis, IN, Nov. 20–22, 2022.
- C19. JP Molnar and **SJ Grauer**, “Reconstructing experimental measurements of supersonic flow via physics-informed BOS,” *75th Annual Meeting of the APS Division of Fluid Dynamics*, Indianapolis, IN, Nov. 20–22, 2022.
- C18. JP Molnar and **SJ Grauer**, “Physics-informed flow field tomography with UQ using a B-PINN,” *74th Annual Meeting of the APS Division of Fluid Dynamics*, Phoenix, AZ, Nov. 21–23, 2021.
- C17. **SJ Grauer** and AM Steinberg, “Direct background-oriented schlieren tomography,” *72nd Annual Meeting of the APS Division of Fluid Dynamics*, Seattle, WA, Nov. 23–26, 2019.
- C16. KJ Daun, **SJ Grauer**, PJ Hadwin, and TA Sipkens, “Chemical species tomography in the Bayesian framework,” at 34th AIAA Aerodynamics Measurement Technology and Ground Testing Conference, Atlanta, GA, Jun. 25–29, 2018.<sup>§</sup>
- C15. TA Sipkens, **SJ Grauer**, PJ Hadwin, and KJ Daun, “Predicting the heat of vaporization of iron at high temperatures using TiRe-LII and Bayesian model selection,” *8th International Workshop on Laser-Induced Incandescence*, Munich, Germany, Jun. 10–13, 2018.
- C14. **SJ Grauer**, “Model error reduction in quantitative gas detection with hyperspectral imaging,” *Telops 13th Annual Workshop on Hyperspectral Imaging*, Munich, Germany, Oct. 16 2017.
- C13. **SJ Grauer**, PJ Hadwin, and KJ Daun, “An a priori approach to assessing a Bayesian design-of-experiment procedure,” *29th Inverse Problems Symposium*, Lexington, VA, Jun. 5–7, 2016 (3 pp).

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<sup>§</sup>Invited talk.

- C12. **SJ Grauer**, PJ Hadwin, and KJ Daun, “Basis function selection for Karhunen–Loève laser absorption tomography,” *28th Inverse Problems Symposium*, East Lansing, MI, May 31–Jun. 3, 2015 (3 pp).

### Posters

- C11. K Zhou and **SJ Grauer**, “Implicit particle sizing and flow reconstruction from inertial particle tracks,” *ICDS Fall 2023 Symposium*, University Park, PA, Oct. 18–19, 2023.
- C10. K Zhou and **SJ Grauer**, “Advection-based data assimilation for particle tracking velocimetry in complex flows,” *Gordon Research Conference 2023*, Newry, ME, Jul. 8–14, 2023.
- C9. JP Molnar, L Venkatakrishnan, BE Schmidt, TA Sipkens, **SJ Grauer**, “Reconstructing supersonic flow from experimental data using scientific machine learning,” *ICDS Fall 2022 Symposium*, University Park, PA, Oct. 12–14, 2022.
- C8. FJ Bauer, PAB Braeuer, MWR Wilke, **SJ Grauer**, S Will, “Mapping soot band gap fields via hyperspectral absorption tomography,” *39th International Symposium on Combustion*, Vancouver, Canada, Jul. 24–29, 2022.
- C7. JP Molnar and **SJ Grauer**, “Bayesian scientific machine learning for flow field tomography with uncertainty quantification,” *ICDS Fall 2021 Symposium*, University Park, PA, Oct. 6–7, 2021.
- C6. E Stanic, TA Sipkens, J Rochussen, **SJ Grauer**, SN Rogak, and P Kirchen, “Gas jet injection characterization using BOS imaging and Abel inversion for engine relevant pressure ratios,” *OSA Optical Sensors and Sensing Congress: Laser Applications to Chemical, Security and Environmental Analysis*, Vancouver, Canada, Jun. 22–26, 2020. [doi:10.1364/3D.2020.JTu2A.14](https://doi.org/10.1364/3D.2020.JTu2A.14)
- C5. **SJ Grauer**, J Emmert, AM Steinberg, S Wagner, and KJ Daun, “High-speed inference of absorbance data for absorption spectroscopy,” *Gordon Research Conference on Laser Diagnostics in Energy and Combustion Science*, Les Diablerets, Switzerland, Jun. 23–28, 2019.
- C4. **SJ Grauer**, A Unterberger, TA Sipkens, AM Kempf, KJ Daun, and K Mohri, “Background-oriented schlieren tomography for instantaneous 3D combustion imaging,” *37th International Symposium on Combustion*, Dublin, Ireland, July 29–Aug. 3, 2018.
- C3. J Menser, **S Grauer**, A Unterberger, A Kempf, and K Mohri, “Volumetrical imaging of the Cambridge Flame using tomography, background-oriented schlieren and high-speed imaging,” *CENIDE-Konferenz 2018*, Duisburg, Germany, Feb. 19, 2018.
- C2. RB Miguel, **SJ Grauer**, and KJ Daun, “A survey of techniques for optical measurement of flare combustion efficiency,” *PTAC Forum Advancing the Low Carbon Economy Through Innovation & R&D*, Calgary, Canada, Oct. 23, 2017.
- C1. TA Sipkens, PJ Hadwin, **SJ Grauer**, and KJ Daun, “Bayesian model selection for laser-induced incandescence,” *Gordon Research Conference on Laser Diagnostics in Combustion*, West Dover, VT, Aug. 6–11, 2017.

### INVITED TALKS

- T21. Technische Universität München, Munich, Germany, June 1, 2023.
- T20. École Polytechnique, Paris, France, May 4, 2023.
- T19. Office National d’Etudes et de Recherches Aérospatiales, Toulouse, France, May 3, 2023.
- T18. Mitsubishi Electric Research Laboratories, Cambridge, MA, Apr. 5, 2023.
- T17. Johns Hopkins University, Baltimore, MD, Mar. 10, 2023.
- T16. University of Minnesota, Twin Cities, Minneapolis, MN, Jan. 18, 2023.
- T15. Shanghai Jiao Tong University, Shanghai, China, Dec. 2, 2022.
- T14. Case Western Reserve University, Cleveland, OH, Oct. 7, 2022.
- T13. Arizona State University, Phoenix, AZ, Sep. 9, 2022.

- T12. FAU Erlangen-Nürnberg (SAOT), Erlangen, Germany, Jul. 11, 2022.  
 T11. FAU Erlangen-Nürnberg (LTT), Erlangen, Germany, Dec. 7, 2021.  
 T10. Air Force Research Laboratory, Wright-Patterson Air Force Base, OH, Nov. 9, 2021.  
 T9. Pennsylvania State University, University Park, PA, Apr. 6, 2021.  
 T8. Pennsylvania State University, University Park, PA, Feb. 18, 2020.  
 T7. Auburn University, Auburn, AL, Jan. 15, 2020.  
 T6. University of Manitoba, Winnipeg, Canada, Jul. 15, 2019.  
 T5. Georgia Institute of Technology, Atlanta, GA, Apr. 2, 2019.  
 T4. University of Alabama, Tuscaloosa, AL, Mar. 6, 2019.  
 T3. University of Waterloo, Waterloo, Canada, Apr. 19, 2018.  
 T2. University of Edinburgh, Edinburgh, United Kingdom, Jan. 23, 2018.  
 T1. University of Duisburg-Essen, Duisburg, Germany, Sep. 27, 2017.

ACADEMIC  
SERVICE

**Reviewer** (91 papers reviewed for 34 outlets; 3 NSF panels)

Optics Express (16 papers); Applied Optics (6 papers); Combustion and Flame (6 papers); Aerospace Science and Technology (5 papers); Applications in Energy and Combustion Science (5 papers); Proceedings of the Combustion Institute (5 papers); Experiments in Fluids (4 papers); Journal of Quantitative Spectroscopy & Radiative Transfer (4 papers); Measurement Science and Technology (4 papers); Optics Letters (4 papers); Journal of Physics: Conference Series (3 papers); Journal of Verification, Validation and Uncertainty Quantification (3 papers); Applied Physics B (2 papers); Flow, Turbulence and Combustion (2 papers); IEEE Transactions on Industrial Informatics (2 papers); Inverse Problems (2 papers); AIAA Journal (1 paper); Applied Sciences (1 paper); ASME Journal of Fluids Engineering (1 paper); Combustion Science and Technology (1 paper); Engineering with Computers (1 paper); Experimental Thermal and Fluid Science (1 paper); Infrared Physics & Technology (1 paper); International Communications in Heat and Mass Transfer (1 paper); International Journal of Heat and Fluid Flow (1 paper); International Journal of Heat and Mass Transfer (1 paper); Journal of the Optical Society of America A (1 paper); Nature Computational Science (1 paper); Nature Machine Intelligence (1 paper); Optics Continuum (1 paper); Physica Scripta (1 paper); Proceedings of ASME Turbo Expo (1 paper); Review of Scientific Instruments (1 paper).

**Supervisor** (current: 7 PhD students)

Joseph P Molnar	PhD	01/2021–Present
Ke Zhou	PhD	01/2022–Present
Ryan J Sirimanne	PhD	02/2022–Present
Amit K Singh	PhD	03/2022–Present
Rui Tang	PhD	08/2022–Present
Reese Peck Cowles	PhD	07/2023–Present
Ruixuan Tang <sup>¶</sup>	PhD	08/2023–Present

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<sup>¶</sup>Co-supervised with Yuan Xuan