

# SEBASTIAN HURTADO PARRA

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## OBJECTIVE:

I seek to leverage my technical expertise and passion for learning to design and build complex instrumentation. I look forward to collaboratively working at the interface of hardware and software to solve problems at the cutting edge of technology.

## EDUCATION:

University of Pennsylvania (*Philadelphia, PA*): Ph.D., Physics (expected May 2022)

Saint Joseph's University (*Philadelphia, PA*): B.S., Physics and Mathematics (May 2015)

## RESEARCH PROJECTS:

**Ultrafast Optical Spectroscopy of Hybrid Organic-Inorganic Perovskites:** Studied dynamics of photoexcited states in 2D perovskites using ultrafast optical techniques. Extended an existing transient photoluminescence setup to a suite of experiments for fuller optical characterization:

- Developed a novel lock-in detection scheme for transient absorption spectroscopy, using time-based readout of a CCD, which dramatically improves signal-to-noise by 10-100x, while reducing collection time by 10x.
- Increased laser stability for sensitive measurements by 20x with a custom-built active laser noise suppressor at lock-in frequencies, utilizing a multi-channel PID feedback to control an electrically driven optical attenuator.
- Designed and fabricated modifications to the existing cryostat sample mounting to improve cooling efficiency.
- Operated and maintained ultrafast laser (modelocked laser, regenerative amplifier, and optical parametric amplifier), cryogenic (wet and cryogen-free), and vacuum systems.

**Magneto-optical imaging:** Collaborated to design and build a polarized optical microscope around an existing 1 T electromagnet, integrating hardware and software into a full measurement platform for various projects:

- Developed imaging software on LabVIEW for instrument use by other users. Software employs real-time image recentering, allowing clean averaging of images while reducing data storage cost by 100x.
- Incorporated a custom-built heated stage for temperature control above room temperature.
- Built and deployed a small 100 mT electromagnet augmentation to an existing cryostat, including custom closed-loop cooling for the magnet coils, for a related project.

**Measurements of Low-Dimensional Materials:** Designed and built electronic transport and magnetometry experiments for various novel materials. Measurements were conducted using Quantum Design's PPMS and MPMS, often interfacing with other electronic instruments. Maintained and repaired the QD systems.

For all my work, I write completely automated LabVIEW data collection software incorporating full programmatic control over a variety of laboratory equipment, with real-time data reporting and analysis.

## SKILLS:

**Software:** Instrument automation & data analysis using: LabVIEW, Python, C/C++. Familiar with system administration on Linux and Windows.

**Hardware:** Maintenance, troubleshooting, and repair of ultrafast laser optics, electronic measurement equipment, and cryogenic and vacuum systems. Familiar with metal machining.

**Linguistic:** Native fluency in English and Spanish.

**Work Authorization:** US Citizen

## PUBLICATIONS:

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1. D. B. Straus, S. Hurtado Parra, N. Iotov, J. Gebhardt, A. M. Rappe, J. E. Subotnik, J. M. Kikkawa, and C. R. Kagan, *J Amer Chem Soc* **138**, 13798 (2016) [DOI link](#)
2. Z. Gao, S. Wang, J. Berry, Q. Zhang, J. Gebhardt, W. M. Parkin, J. Avila, H. Yi, C. Chen, S. Hurtado-Parra, M. Drndić, A. M. Rappe, D. J. Srolovitz, J. M. Kikkawa, Z. Luo, M. C. Asensio, F. Wang, and A. T. C. Johnson, *Nature Commun* **11**, 546 (2020) [DOI link](#)
3. K. Du, S. D. Zemerov, S. Hurtado-Parra, J. M. Kikkawa, and I. J. Dmochowski, *Inorg Chem* **59**, 13831 (2020) [DOI link](#)
4. D. B. Straus, S. Hurtado-Parra, N. Iotov, Q. Zhao, M. R. Gau, P. J. Carroll, J. M. Kikkawa, and C. R. Kagan, *ACSNano* **14**, 3621 (2020) [DOI link](#)
5. D Khadka, T. R. Thapaliya, S. Hurtado Parra, X. Han, J. Wen, R. F. Need, P. Khanal, W. Wang, J. Zang, J. M. Kikkawa, L. Wu, S. X. Huang, *Science Advances* **6**, eabc1977 (2020) [DOI link](#)
6. D Khadka, T. R. Thapaliya, S. Hurtado Parra, J. Wen, R. Need, J. M. Kikkawa, S. X. Huang, *Phys Rev Mat* **4**, 084203 (2020) [DOI link](#)
7. T. R. Thapaliya, T. Yoo, S. Hurtado Parra, N. D. Arndt, R. F. Need, J. M. Kikkawa, H. Kim, and S. X. Huang, *Appl Phys Lett* **119**, 201902 (2021) [DOI link](#)
8. Q. Zhang, S. Wang, Z. Gao, S. Hurtado-Parra, J. Berry, Z. Addison, P. M. Dais, W. M. Parkin, M. Drndic, J. M. Kikkawa, F. Wang, E. J. Mele, Z. Luo, A. T. C. Johnson, *submitted*
9. H. Kang, Q. Zhang, D. Paul, M. Q. Zhao, S. Friedensen, R. Patel, S. Hurtado Parra, S. J. Hong, Z. Gao, C. Wen, L. Bassett, J. M. Kikkawa, M. Drndic, Y. W. Park, A. T. C. Johnson, *submitted*
10. S. Hurtado Parra, T. R. Thapaliya, J. M. Kikkawa, and S. X. Huang, *in preparation*
11. S. Hurtado Parra, D. B. Straus, C. R. Kagan, J. M. Kikkawa, *in preparation*

## AWARDS & HONORS:

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- University of Pennsylvania, 2019 Arnold M. Denenstein Prize: “For his expertise in the design of low-temperature ultrafast optical experiments and associated measurements.”
- PennApps XV, Top 30 (Cryptoino): [project link](#)
- PennApps XIV, 3rd Place (EyeHUD): [project link](#)
- Honors Societies: Phi Beta Kappa, Sigma Pi Sigma (Physics), Sigma Xi (Scientific Research), Pi Mu Epsilon (Mathematics)
- REUs: University of Pennsylvania LRSM (2014), University of Chicago (2013)
- Saint Joseph’s University, 2012 & 2014 Summer Scholars Program

## TEACHING EXPERIENCE:

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Teaching Assistant: *University of Pennsylvania* (2016-2017)

Laboratory Teaching Assistant: *Saint Joseph’s University* (2013-2014)

Tutor/Supplemental Instruction Leader: *Saint Joseph’s University* (2012-2015)

## PERSONAL REFERENCE:

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Jay Kikkawa (Ph.D. Advisor)

[please email me for reference contact]

Professor, University of Pennsylvania

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