

# DR VERONIKA SUNKO

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## EDUCATION & ACADEMIC APPOINTMENTS

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- 2021-Present **University of California, Berkeley, USA**  
Miller Fellow  
Host: Prof Joseph Orenstein
- 2020-Present **Max Planck Institute for Chemical Physics of Solids, Germany**  
Minerva Fast Track Fellow
- 2015-2019 **University of St Andrews, UK**  
**Max Planck Institute for Chemical Physics of Solids, Germany**  
PhD in Physics  
Thesis: Angle resolved photoemission spectroscopy of delafossite metals  
Advisors: Prof Phil King, Prof Andy Mackenzie
- 2009-2014 **University of Zagreb, Croatia**  
MS in Physics  
Thesis: Magnetic dynamics of the bilayer manganite  $\text{La}_{1.4}\text{Sr}_{1.6}\text{Mn}_2\text{O}_7$   
Advisor: Dr Ivica Živković  
Grade average 4.976/5
- 2013 **French Alternative Energies and Atomic Energy Commission (CEA), France**  
Research Intern  
Thesis: Nonlinear dielectric susceptibility in glass-forming tripropylene glycol  
Advisor: Dr François Ladieu

## FELLOWSHIPS

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- 2021-2024 Miller Research Fellowship, UC Berkeley  
2020 Minerva Fast Track Fellowship

## HONORS, AWARDS, & PRIZES

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- 2023 Selected for participation in the “Rising Stars Workshop,” UC Berkeley
- 2020 Otto Hahn Medal of the Max Planck Society
- 2020 Richard L. Greene Dissertation Award in Experimental Condensed Matter or Materials Physics
- 2019 Woodruff Thesis Prize
- 2019 Springer Thesis Prize
- 2016 Selected for participation in the Lindau Nobel Laureate Meeting
- 2014 Rector’s Prize for Public Engagement, University of Zagreb
- 2014 Faculty of Science Prize for Exceptional Success During Studies, University of Zagreb
- 2009 Bronze Medal at the International Physics Olympiad, Merida, Mexico
- 2008 Bronze Medal at the International Physics Olympiad, Hanoi, Vietnam
- 2008 2nd Place, International Young Physicists’ Tournament (experimental group competition), Trogir, Croatia
- 2007 12th Place, International Young Physicists’ Tournament (experimental group competition), Seoul, Republic of Korea

## SERVICE

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- 2023 Co-organiser of the “Winter School for Quantum Information Science,” UC Berkeley
- 2022-2023 Member of the “Miller Institute Interdisciplinary Symposium” Committee, UC Berkeley
- 2021 Reviewer for the “Emergent Phenomena in Quantum Systems (EPiQS) flexible funding grants” of the Moore Foundation
- 2021- Reviewed papers for Nature Physics, Proceedings of the National Academy of Sciences (PNAS), Physical Review Letters (PRL), Physical Review B (PRB)

## TEACHING, MENTORING, & OUTREACH

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### Teaching:

- 2023 Guest Lecturer in an Undergraduate Solid State Physics class at UC Berkeley
- 2020 Created and run the ‘Effective public speaking’ workshop at MPI-CPfS
- 2016 Workshop supervisor for the Physics 2B course, University of St Andrews
- 2015 Tutoring for Interacting Electrons Problem, an advanced undergraduate/graduate condensed matter course, University of St Andrews
- 2011-2013 Undergraduate Teaching Assistant, General Physics I-IV

### Mentoring & Supervising:

- 2021-Present Supervising and mentoring four graduate students at UC Berkeley
- 2020-Present Advising a postdoc and graduate student working on optical probes of quantum materials at MPI-CPfS, Dresden
  - 2014 Project leader at the Summer School of Science in Požega, Croatia
  - 2011 Leader of the Croatian team on the International Young Physicists’ Tournament in Tehran, Iran (bronze medal)
- 2009, 2011 Leader of workshops at the Summer School for Young Physicists, Mali Lošinj, Croatia

### Outreach & Public Engagement:

- 2023 Presenter, Quantum Gathering, UC Berkeley
- 2021 Outreach at El Cerrito High School
- 2018 Presenter, The Long Night of Science, an outreach event in Dresden
- 2015 Presenter, Science Discovery Day, an outreach event at the School of Physics and Astronomy, St Andrews
- 2013-2014 Involved in the work of “Physics Express,” a program for popularisation of physics in elementary and high schools

## SELECTED PRESENTATIONS

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### Invited Conference Talks:

- 25. Korea-Europe Workshop on Quantum Materials; Stuttgart, Germany; September 2024
- 24. International Workshop on Unconventional Metals, Magnets and Superconductors; Berlin, Germany; August 2024
- 23. From Solid State to Biophysics X; Cavtat, Croatia; June 2024
- 22. Materials Research Society Spring Meeting; Seattle, USA; April 2024
- 21. New Horizons in Quantum and Energy Materials; Stuttgart, Germany; November 2023
- 20. Electron Correlations beyond the Quasiparticle Paradigm: Theory and Experiment; Santa Barbara, USA; September 2023 (declined due to scheduling conflicts)
- 19. New Generation in Strongly Correlated Electron Systems (NGSCES); Iseo, Italy; September 2022
- 18. Correlations and Angle-Resolved Photoemission Spectroscopy (CORPES22); virtual; July 2022
- 17. Topological Quantum Electrons Interacting In-person; Quy Nhon, Vietnam; July 2022
- 16. Gordon Research Conference on Correlated Electrons; Mount Holyoke College, USA; June 2022

15. “Putting Strain on the System: Controlling Electrons and Spin using Strain” workshop at the annual Advanced Light Source Users Meeting; Berkeley, USA; August 2021
14. APS March Meeting; virtual; March 2021
13. Interdisciplinary Surface Science Conference; virtual; April 2021
12. Gordon Research Conference on Correlated Electrons; June 2020 (cancelled)
11. From Solid State to Biophysics X; Cavtat, Croatia, June 2020 (cancelled)
10. “Frontiers of Quantum Matter” workshop at the Weizmann Institute; Rehovot, Israel; December 2019
9. “Layered Quantum Materials: Electronic and Magnetic Properties” workshop at the annual Advanced Light Source Users Meeting; Berkeley, USA; October 2019
8. International Conference on Strongly Correlated Electron Systems (SCES); Okayama, Japan; September 2019
7. Condensed Matter and Quantum Materials Conference; St Andrews, UK; July 2019
6. Theoretical and Experimental Magnetism Meeting; Abington, UK; 2019 (declined due to scheduling conflicts)
5. Superstripes; Ischia, Italy; 2019 (declined due to scheduling conflicts)
4. APS March Meeting; Boston, USA; March 2019
3. UK-NL Condensed Matter Workshop; Oxford, UK; August 2018
2. Theoretical and Experimental Magnetism Meeting; Abington, UK; July 2018
1. Superstripes: Quantum physics in Complex Matter: Superconductivity, Magnetism and Ferroelectricity; Ischia, Italy; June 2017

**Invited Seminars:**

22. Quantum Matter Seminar, Stanford, USA, November 2024 (planned)
21. Quantum Matter Seminar, Cornell, USA, October 2024
20. Quantum Matter Seminar, Caltech, USA, October 2024
19. Grete-Hermann-Network Colloquium, remote, January 2024
18. Condensed Matter Seminar, UC Irvine, USA, November 2023
17. Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany, November 2023
16. Condensed Matter Seminar, University of Utah, USA, October 2023
15. Applied Physics Seminar, University of Kansas, UAS, October 2023
14. Condensed Matter Seminar, University of Notre Dame, USA, April 2023
13. Virtual Seminar Series, Columbia University, November 2022
12. Condensed Matter Seminar, University of Ohio, Columbus, October 2022
11. Condensed Matter Seminar, UC San Diego, October 2022
10. 290K Seminar, UC Berkeley (remote), October 2020
9. Tsung Dao Lee Institute, Shanghai, China (remote), June 2020
8. TU Delft, Delft, Netherlands, August 2019
7. Stanford University, USA, August 2019
6. MPI for Solid State Physics, Stuttgart, Germany, July 2019
5. Condensed Matter Physics Seminar, Cambridge University, UK, January 2019
4. Condensed Matter Physics Seminar, MIT, Cambridge, USA, September 2018
3. Institute of Physics, Zagreb, Croatia, April 2018
2. Institut für Festkörperphysik, TU Wien, Vienna, Austria, February 2018
1. Instituto de Física de Líquidos y Sistemas Biológicos, La Plata, Argentina, December 2017

## PUBLICATIONS

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### Pre-Prints:

2. M. Vila, **V. Sunko**, J. E. Moore “Orbital-spin Locking and its Optical Signatures in Altermagnets,” arXiv:2410.23513 (2024)
1. **V. Sunko\***, C. Liu\*, M. Vila\*, I. Na, Y. Tang, V. Kozii, S. M. Griffin, J. E. Moore, J. Orenstein, “Linear magneto-conductivity as a DC probe of time-reversal symmetry breaking,” arXiv:2310.15631 (2023)

### Peer-Reviewed:

24. F. Sun, S. Mishra, U. Stockert, R. Daou, N. Kikugawa, R. S. Perry, E. Hassinger, S. A. Hartnoll, A. P. Mackenzie, **V. Sunko**<sup>†</sup>, “The Lorenz ratio as a guide to scattering contributions to Planckian transport,” *Proc. Natl. Acad. Sci. U.S.A.* **121**(35), e2318159121 (2024)
23. E. Donoway, T. V. Trevisan, A. Liebman-Peláez, R. P. Day, K. Yamakawa, Y. Sun, J. R. Soh, D. Prabhakaran, A. T. Boothroyd, R. M. Fernandes, J. G. Analytis, J. E. Moore, J. Orenstein, **V. Sunko**<sup>†</sup>, “Multimodal Approach Reveals the Symmetry-Breaking Pathway to the Broken Helix in  $\text{EuIn}_2\text{As}_2$ ” *Phys. Rev. X* **14**(3), 031013 (2024)
22. L. Ye, Y. Sun, **V. Sunko**, J. F. Rodriguez-Nieva, M. S. Ikeda, T. Worasaran, M. E. Sorensen, M. D. Bachmann, J. Orenstein, I. R. Fisher, “Elastocaloric Signatures of Symmetric and Antisymmetric Strain-Tuning of Quadrupolar and Magnetic Phases in  $\text{DyB}_2\text{C}_2$ ,” *Proc. Natl. Acad. Sci. U.S.A.* **120**(35), e2302800120 (2023)
21. **V. Sunko\***, Y. Sun\*, M. Vranas, C. C. Homes, C. Lee, E. Donoway, Z.-C. Wang, S. Balguri, M. B. Mahendru, A. Ruiz, B. Gunn, R. Basak, E. Schierle, E. Weschke, F. Tafti, A. Frano, J. Orenstein, “Spin-Carrier Coupling Induced Ferromagnetism and Giant Resistivity Peak in  $\text{EuCd}_2\text{P}_2$ ,” *Phys. Rev. B* **107**(14), 144404 (2023)
20. F. Sun, S. Mishra, P. H. McGuinness, Z. H. Filipiak, I. Marković, D. A. Sokolov, N. Kikugawa, J. W. Orenstein, S. A. Hartnoll, A. P. Mackenzie, **V. Sunko**<sup>†</sup>, “A spatially resolved optical method to measure thermal diffusivity,” *Rev. Sci. Instrum.* **94**(4), 043003 (2023)
19. F. Mazzola, C.-M. Yim, **V. Sunko**, S. Khim, P. Kushwaha, O. J. Clark, L. Bawden, I. Marković, D. Chakraborti, T. K. Kim, M. Hoesch, A. P. Mackenzie, P. Wahl, P. D. C. King, “Tuneable Electron–Magnon Coupling of Ferromagnetic Surface States in  $\text{PdCoO}_2$ ,” *npj Quantum Mater.* **7**, 20 (2022)
18. **V. Sunko**, D. Milosavljević, F. Mazzola, O. J. Clark, U. Burkhardt, T. K. Kim, H. Rosner, Yu. Grin, A. P. Mackenzie, P. D. C. King, “Surface and Bulk Electronic Structure of Aluminium Diboride,” *Phys. Rev. B* **102**(3), 035143 (2020)
17. C. Putzke, M. D. Bachmann, P. McGuinness, E. Zhakina, **V. Sunko**, M. Konczykowski, T. Oka, R. Moessner, A. Stern, M. König, S. Khim, A. P. Mackenzie, P. J.W. Moll, “h/e Oscillations in Interlayer Transport of Delafossites,” *Science* **368**(6496), 1234 (2020)
16. **V. Sunko\***, P. H. McGuinness\*, C. S. Chang, E. Zhakina, S. Khim, C. E. Dreyer, M. Konczykowski, H. Borrmann, P. J. W. Moll, M. König, D. A. Muller, A. P. Mackenzie, “Controlled Introduction of Defects to Delafossite Metals by Electron Irradiation,” *Phys. Rev. X* **10**(2), 021018 (2020)
15. **V. Sunko\***, F. Mazzola\*, S. Kitamura\*, S. Khim, P. Kushwaha, O. J. Clark, M. Watson, I. Marković, D. Biswas, L. Pourovskii, T. K. Kim, T.-L. Lee, P. K. Thakur, H. Rosner, A. Georges, R. Moessner, T. Oka, A. P. Mackenzie, P. D. C. King, “Probing spin correlations using angle resolved photoemission in a coupled metallic/Mott insulator system,” *Sci. Adv.*, **6**(6), eaaz0611 (2020)
14. **V. Sunko**, E. Abarca Morales, I. Marković, M. E. Barber, D. Milosavljević, F. Mazzola, D. A. Sokolov, N. Kikugawa, C. Cacho, P. Dudin, H. Rosner, C. W. Hicks, P. D. C. King, A. P. Mackenzie, “Direct Observation of a Uniaxial Stress-driven Lifshitz Transition in  $\text{Sr}_2\text{RuO}_4$ ,” *npj Quantum Mater.* **4**, 46 (2019)
13. H. Usui, M. Ochi, S. Kitamura, T. Oka, D. Ogura, H. Rosner, M. W. Haverkort, **V. Sunko**, P. D. C. King, A. P. Mackenzie, K. Kuroki, “Hidden kagome-lattice picture and origin of high conductivity in delafossite  $\text{PtCoO}_2$ ,” *Phys. Rev. Materials* **3**(4), 045002 (2019)

12. M. D. Watson, O. J. Clark, F. Mazzola, I. Marković, **V. Sunko**, T. K. Kim, K. Rossnagel, P. D. C. King, “Orbital- and  $k_z$ - Selective Hybridization of Se 4*p* and Ti 3*d* States in the Charge Density Wave Phase of TiSe<sub>2</sub>,” *Phys. Rev. Lett.* **122**(7), 076404 (2019)
11. O. J. Clark, F. Mazzola, J. Feng, **V. Sunko**, I. Marković, L. Bawden, T. K. Kim, P. D. C. King, M. S. Bahramy, “Dual quantum confinement and anisotropic spin splitting in the multivalley semimetal PtSe<sub>2</sub>,” *Phys. Rev. B* **99**(4), 045438 (2019)
10. M. S. Bahramy, O. J. Clark, B.-J. Yang, J. Feng, L. Bawden, J. M. Riley, I. Marković, F. Mazzola, **V. Sunko**, D. Biswas, S. P. Cooil, M. Jorge, J. W. Wells, M. Leandersson, T. Balasubramanian, J. Fujii, I. Vobornik, J. E. Rault, T. K. Kim, M. Hoesch, K. Okawa, M. Asakawa, T. Sasagawa, T. Eknapakul, W. Meevasana, P. D. C. King, “Ubiquitous formation of bulk Dirac cones and topological surface states from a single orbital manifold in transition-metal dichalcogenides,” *Nat. Mater.* **17**(1), 21 (2018)
9. O. J. Clark, M. J. Neat, K. Okawa, L. Bawden, I. Markovic, F. Mazzola, J. Feng, **V. Sunko**, J. M. Riley, W. Meevasana, J. Fujii, I. Vobornik, T. K. Kim, M. Hoesch, T. Sasagawa, P. Wahl, M. S. Bahramy, P. D. C. King, “Fermiology and Superconductivity of Topological Surface States in PdTe<sub>2</sub>,” *Phys. Rev. Lett.* **120**(15), 156401 (2018)
8. S. Kitamura, H. Usui, R.-J. Slager, A. Bouhon, **V. Sunko**, H. Rosner, P. D. C. King, J. Orenstein, R. Moessner, A. P. Mackenzie, K. Kuroki, T. Oka, “Spin Hall effect in 2d metallic delafossite PtCoO<sub>2</sub> and vicinity topology,” arXiv:1811.03105 (2018)
7. F. Mazzola, **V. Sunko**, S. Khim, H. Rosner, P. Kushwaha, O. J. Clark, L. Bawden, I. Marković, T. K. Kim, M. Hoesch, A. P. Mackenzie, P. D. C. King, “Itinerant ferromagnetism of the Pd-terminated polar surface of PdCoO<sub>2</sub>,” *Proc. Natl. Acad. Sci. U.S.A.* **115**(51), 12956 (2018)
6. N. Nandi, T. Scaffidi, P. Kushwaha, S. Khim, M. E. Barber, **V. Sunko**, F. Mazzola, P. D. C. King, H. Rosner, P. J. W. Moll, M. König, J. E. Moore, S. Hartnoll, A. P. Mackenzie, “Unconventional magneto-transport in ultrapure PdCoO<sub>2</sub> and PtCoO<sub>2</sub>,” *npj Quantum Mater.* **3**, 66 (2018)
5. F. Arnold, M. Naumann, S. Khim, H. Rosner, **V. Sunko**, F. Mazzola, P. D. C. King, A. P. Mackenzie, E. Hassinger “Quasi-two-dimensional Fermi surface topography of the delafossite PdRhO<sub>2</sub>,” *Phys. Rev. B* **96**(7), 075163 (2017)
4. P. Kushwaha, H. Borrmann, S. Khim, H. Rosner, P. J. W. Moll, D. A. Sokolov, **V. Sunko**, Yu. Grin, A. P. Mackenzie, “Single Crystal Growth, Structure, and Electronic Properties of Metallic Delafossite PdRhO<sub>2</sub>,” *Cryst. Growth Des.* **17**(8), 4144 (2017)
3. **V. Sunko**, H. Rosner, P. Kushwaha, S. Khim, F. Mazzola, L. Bawden, O. J. Clark, J. M. Riley, D. Kasinathan, M. W. Haverkort, T. K. Kim, M. Hoesch, J. Fujii, I. Vobornik, A. P. Mackenzie, P. D. C. King, “Maximal Rashba-like spin splitting via kinetic-energy-coupled inversion-symmetry breaking,” *Nature* **549**(7673), 492 (2017)
2. L. Bawden, S. P. Cooil, F. Mazzola, J. M. Riley, L. J. Collins-McIntyre, **V. Sunko**, K. W. B. Hunvik, M. Leandersson, C. M. Polley, T. Balasubramanian, T. K. Kim, M. Hoesch, J. W. Wells, G. Balakrishnan, M. S. Bahramy, P. D. C. King, “Spin-valley locking in the normal state of a transition-metal dichalcogenide superconductor,” *Nat. Commun.* **7**, 11711, (2016)
1. P. Kushwaha, **V. Sunko**, P. J. W. Moll, L. Bawden, J. M. Riley, N. Nandi, H. Rosner, M. P. Schmidt, F. Arnold, E. Hassinger, T. K. Kim, M. Hoesch, A. P. Mackenzie, P. D. C. King “Nearly free electrons in a 5*d* delafossite oxide metal,” *Sci. Adv.* **1**(9), e1500692 (2015)

\* indicates equal contribution

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