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## Joseph P. Heremans

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### **Business Address:**

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### **Education:**

Ecole Polytechnique de Louvain, Université Catholique de Louvain (University of Louvain), Belgium  
1978: Doctor of Applied Sciences, Physics (Docteur en Sciences Appliquées)  
1975: Bachelor in Electrical Engineering (Ingénieur Civil Electricien)

### **Positions:**

2005 – Present: Ohio Eminent Scholar and Professor, The Ohio State University, Department of Mechanical and Aerospace Engineering, Department of Physics (Courtesy), and Department of Material Science and Engineering (Courtesy).  
2000 - 2005: Research Fellow, Delphi Corporation, Delphi Research Labs.  
1999: Principal Research Scientist, Delphi Automotive Systems, Delphi Research Labs.  
1989 - 1998: Principal Research Scientist, GM Research Labs (later GM Research & Development Center).  
1989: Visiting Professor, Physics and Physical Chemistry Department, University of Louvain, Belgium.  
1987 - 1989: Senior Staff Research Scientist, GM Research Labs.  
1987 - 1998: Manager of the Semiconductor Materials Section, GM Research & Development Center, Physics and Physical Chemistry Department.  
1985 - 1987: Staff Research Scientist, GM Research Labs.  
1985 - 1987: Group Leader of the Electrooptical Physics group, GM Research Labs.  
1984: Senior Research Scientist, Physics Department, GM Research Labs.  
1978 - 1983: Researcher, Fonds National Belge de la Recherche Scientifique (Belgian National Science Foundation).  
1982: Visiting Scientist, Institute for Solid State Physics, University of Tokyo.  
1980, 1981: Visiting Scientist, Massachusetts Institute of Technology.  
1979, 1983: Visiting Scientist, H.C. Oersted Institute, University of Copenhagen.  
1979: Military service in the Belgian Army, Royal Military School, Plasma Physics Laboratory.  
1975 - 1978: Research fellowship, Belgian Institute for Research in Industry and Agriculture (IRSIA).

### **Publications (ORCID 0000-0003-3996-2744):**

>260 publications in refereed journals and conference proceedings. (ISI numbers: >18000 citations, h=60; Google Scholar >27000 citations, h=69). Some examples are:

- Joseph P. Heremans and Joshua Martin, Thermoelectric Measurements *Nature Materials* **23**, 18–19 (2024) <https://doi.org/10.1038/s41563-023-01726-7> (IF=41.2)
- Brandi L. Wooten, Ryo Iguchi, Ping Tang, Joon Sang Kang, Ken-ichi Uchida, Gerrit E. W. Bauer and Joseph P. Heremans, “Electric field–dependent phonon spectrum and heat conduction in ferroelectrics”, *Science Advances* **9**, eadd7194 (2023); <http://doi.org/10.1126/sciadv.add7194> (IF=14.14)
- Ken-ichi Uchida and Joseph P. Heremans, “Thermoelectrics: from Longitudinal to Transverse”, *Joule*, **6**, 1–6, October 19, 2022; <http://doi.org/10.1016/j.joule.2022.08.016> (IF= 46.048)
- Dung Vu, Wenjuan Zhang, Cüneyt Şahin, Michael E. Flatté, Nandini Trivedi, Joseph P. Heremans, “Thermal chiral anomaly in the magnetic-field induced ideal Weyl phase of Bi<sub>1-x</sub>Sb<sub>x</sub> topological insulators”, *Nature Materials* **20**, 1525–1531 (2021) <http://doi.org/10.1038/s41563-021-00983-8> (2021) (IF=41.2)
- Y. Zheng, T. Lu, Md M. H. Polash, M. Rasouliyanboroujeni, N. Liu, M. E. Manley, Y. Deng, P. J. Sun, X. L. Chen, R. P. Hermann, D. Vashaee, J. P. Heremans, and H. Zhao, “Paramagnon drag in high thermoelectric

figure of merit Li-doped MnTe“, *Science Advances*, **5**, eaat9461, (2019) <http://doi.org/10.1126/sciadv.aat9461> (IF=12.08)

- He, B., Wang, Y., Arguilla, M. Q., Cultrara, N. D., Scudder, M. R., Goldberger, J. E., Windl, W., and Heremans, J. P., “The Fermi Surface Geometrical Origin of Axis-Dependent Conduction Polarity in Layered Materials,” *Nature Materials*. **18** 568-572 (2019) <http://doi.org/10.1038/s41563-019-0309-4> (IF=39.737).
- Heremans, J. P., Cava, R. J., and Samarth, N. (2017), “Tetradymites as Thermoelectrics and Topological Insulators,” *Nature Reviews Materials* **2** 17049 (2017) <http://doi.org/10.1038/natrevmats.2017.49> [cover] (IF=74.449)
- Jin, H., Restrepo, O. D., Antolin, N., Boona, S. R., Windl, W., Myers, R. C., and Heremans, J. P., “The Phonon-induced Diamagnetic Force and its Effect on the Lattice Thermal Conductivity,” *Nature Materials* **14**, 601-606 (2015) <http://dx.doi.org/10.1038/nmat4247> (IF=47.656) [cover].
- Boona, S. R., Myers, R. C., and Heremans, J. P., “Spin Caloritronics,” *Energy Environ. Sci.*, **7**, 885-910 (2014) (<http://doi.org/10.1039/C3EE43299H>) (IF = 29.518).
- Heremans, J. P., Dresselhaus, M. S., Bell, L., and Morelli, D. T., “When Thermoelectrics Reached the Nanoscale,” *Nature Nanotechnology* **8**, 471-473 (2013) (IF = 38.986).
- Jaworski, C. M., Myers, R. C., Johnston-Halperin, E., and Heremans, J. P., “Giant Spin Seebeck Effect in a Non-magnetic Material,” *Nature* **487**, 210-213 (2012) (<http://doi.org/10.1038/nature11221>) (IF = 40.137) [cover].
- Jaworski, C. M., Yang, J., Mack, S., Awschalom, D. D., Heremans, J. P., and Myers, R. C., “Observation of the Spin-Seebeck Effect in a Ferromagnetic Semiconductor,” *Nature Materials* **9** 898-903 (2010) <http://doi.org/10.1038/nmat2860> (IF=47.656).
- Heremans, J. P., Jovovic, V., Toberer, E. S., Saramat, A., Kurosaki, K., Charoenphakdee, A., Yamanaka, S., and Snyder, G. J., “Enhancement of Thermoelectric Efficiency in PbTe by Distortion of the Electronic Density of States,” *Science* **321** 554 -558 (2008) <http://doi.org/10.1126/science.1159725> (IF = 37.205).
- Partin, D. L., and Heremans, J. P., “Growth of Narrow Bandgap Semiconductors,” *Handbook on Semiconductors, Volume 3*, (Moss, T. S., Ed.; Mahajan, S., Ed.) pp. 369-450, Elsevier, 1994.

### 3 books (co-editor):

- *Karl W. Böer Survey of Semiconductor Physics*, Wiley-Interscience (2002).
- *Growth, Characterization and Properties of Ultrathin Magnetic Films and Multilayers*, Materials Research Society (1989).
- National Academies of Sciences, Engineering, and Medicine. 2019. *Frontiers of Materials Research: A Decadal Survey*, The National Academies Press, Washington, DC. <https://dx.doi.org/10.17226/25244>

**40 US Patents issued:** two portfolios (tunable IR diode lasers, crankshaft position sensors) became commercial.

### Honors and Activities

- Member, National Academy of Engineering (2013).
- Fellow, American Association for the Advancement of Science AAAS (2011).
- Fellow, American Physical Society (1987).
- Guest Professor, Zhejiang University (2010-present).
- Elected chair, Forum for Industrial and Applied Physics, American Physical Society, 2008; member of the executive committee as vice-chair in 2006, chair-elect in 2007, past-chair in 2009.
- Member: American Physical Society, Committee for Applications of Physics (1992-5); American Association for the Advancement of Science; Materials Research Society.
- OSU: Recipient, Clara M. and Peter L. Scott Award for Excellence in Engineering Education (2014); Distinguished Graduate Faculty Award (2021)
- Industry: General Motors Corporation: John M. Campbell Award (1989), Charles L. McCuen Award (1994), Charles F. Kettering Award (1995); Delphi Automotive Systems, Inventors Hall of Fame (1999); Gold Level (2004), Scientific Excellence Award (2003).
- Co-founder, GonioTech LLC.

### Research interests

Experimental investigation of electron, phonon and spin transport in semiconductor, semimetals, topological and magnetic materials

- Polarization caloritronics: electrical control of heat transport by the thermal perturbations of the polarization in ferroelectrics.
- Thermal transport in topological and quantum matter, e.g. Weyl semimetals (2021)
- Goniopolar materials exhibit simultaneous n- and p-type behavior by the same charge carriers (2019)
- Phonons in diamagnets respond to magnetic fields (2015)
- Spin-Seebeck effect in ferromagnets, antiferromagnets and InSb, a diamagnetic semiconductor (2012).
- Resonant levels increase the thermoelectric figure of merit (2008).
- Geometrical magnetosebeck and magnetoresistance effects – commercial position sensors used on crank and camshafts by GM (1990s).
- Tunable infrared lead-salt diode lasers (1984)

**Advisees:****PhD (graduated):**

Vladimir Jovovic (Jet Propulsion Laboratory), Michele Nielsen (Corning), Chris Jaworski, Yibin Gao (Didi, Beijing), Hyungyu Jin (Asst Prof. Postech), Arati Prakash (Management Consultant, McKinsley and Associates), Bin He (postdoc, Max Planck Institute Dresden), Sarah Watzman (Asst. Prof. U. Cincinnati), Mike Adams. (postdoc, Georgia Tech.); Yuanhua Zheng; Dung Vu (postdoc, Yale).

**PhD (candidates):**

Brandi Wooten, Minyue Zhu, Jianmin Wen, Delaram Rashadfar, Mohamed Nawwar

**MS (graduated):**

Suresh Joottu Thiagarajan, Eric Evola (National Instruments), Sunphil Kim (PhD at UIUC), Christine Orovets, Mark Verosky

**Postdocs:**

Audrey Chamoire, Yun Zhang, Hyungyu Jin, Michele Nielsen, Stephen Boona, Koen Vandaele, Bin He, Joon Sang Kang (Asst. Prof, Korean Advanced Institute of Science and Technology).

**Visitors (proto-postdocs):**

Yi Chen, Bartek Wiendlocha, Keisuke Hirata

**Undergraduate Researchers**

Katherine Whitehouse, Christine Orovets, Chao Xu(chemistry), Erin Wells, Luyang Wang, Jocelyn Jiao, Simon Bogason, Jackson Hise.

**Committee Member:**

**PhD (graduated):** Yaxian Wang (postdoc, Harvard), Lei Chen, Phillip Evans, Arpit Mittal, Leon Headings, Sushma Stantapuri, Benjamin Goldberg, Zihao Yang, Zakari Eckert, Brandon Giles.

**PhD (candidates):** Elan Weiss, Felipe Pacci-Evaristo, John Jamison.

**MS:** Benjamin Kellie, Sarvani Piratla, Sayed Ali.

**Graduate Faculty Representative:**

William M. Broughton (2021), Izolda Wolski-Moskoff (2019), Arly Drake (2018), Elena Chung (2016), Jaleh Sharif (2015), Jo Marie Bacusmo (2014), William Moulder (2012), Fu-Chen Yu (2011), Katherine Becker (2009), Derek Lincoln (2007)

**Archival Journal Publications (including review articles and book chapters)**

235. Joseph P. Heremans and Joshua Martin, Thermoelectric Measurements *Nature Materials* **23**, 18–19 (2024) <https://doi.org/10.1038/s41563-023-01726-7> (IF=41.2)
234. Goto, Yosuke; Usui, Hidetomo; Murata, Masayuki; Goldberger, Joshua; Heremans, Joseph; Lee, Chul-Ho, "Band anisotropy generates axis-dependent conduction polarity of  $\text{Mg}_3\text{Sb}_2$  and  $\text{Mg}_3\text{Bi}_2$ ", *Chemistry of Materials* (accepted, 2024) (IF=10.8)
233. G.E.W. Bauer, P. Tang, R. Iguchi, J. Xiao, K. Shen, Z. Zhong, T. Yu, S.M. Rezende, J. P. Heremans. And K. Uchida, Polarization transport in ferroelectrics *Phys. Rev. Applied* **20**, 050501 (2023) <https://doi.org/10.1103/PhysRevApplied.20.050501> (IF=4.6)
232. Andrew M. Ochs, Gerhard H. Fecher, Bin He, Walter Schnelle, Claudia Felser, Joseph P. Heremans, Joshua E. Goldberger "Synergizing a Large Ordinary Nernst Effect and Axis-Dependent Conduction Polarity in Flat Band  $\text{KMgBi}$  Crystals", published online *Advanced Materials*, (2023) <https://doi.org/10.1002/adma.202308151> (IF=29.4)
231. Dung D. Vu, Ryan A. Nelson, Brandi L. Wooten, Joseph Barker, Joshua E. Goldberger, Joseph P. Heremans "Magnetic field-controlled lattice thermal conductivity in  $\text{MnBi}_2\text{Te}_4$ ", *Physical Review B* **108**, 144402 (2023), <https://doi.org/10.1103/PhysRevB.108.144402> (IF=3.9)
230. Joon Sang Kang, Dung Vu, Minyue Zhu and Joseph P. Heremans "Large and optimized thermal chiral anomaly in Weyl semimetal  $\text{BiSb}$ ", *Physical Review Applied* **20** 034014 (2023) <https://doi.org/10.1103/PhysRevApplied.20.034014> (IF=4.6)
229. Ryan A. Nelson, Ziling Deng, Andy Ochs, Karl Koster, Cullen Irvine, Joseph P. Heremans, Wolfgang Windl and Joshua E. Goldberger "Axis Dependent Conduction Polarity in the Air-Stable Semiconductor,  $\text{PdSe}_2$ ", *Materials Horizons* <https://doi.org/10.1039/d3mh00537b> (IF=14.356)
228. Koster, Karl; Deng, Ziling; Heremans, Joseph; Windl, Wolfgang; Goldberger, Joshua "Axis-Dependent Conduction Polarity in  $\text{WSi}_2$  Single Crystals", *Chemistry of Materials* **35**, 4228–4234 (2023) <http://doi.org/10.1021/acs.chemmater.3c00183> (IF= 10.508)
227. Brandi L. Wooten, Ryo Iguchi, Ping Tang, Joon Sang Kang, Ken-ichi Uchida, Gerrit E. W. Bauer and Joseph P. Heremans, "Electric field-dependent phonon spectrum and heat conduction in ferroelectrics", *Science Advances* **9**, eadd7194 (2023); <https://doi.org/10.1126/sciadv.add7194> (IF=14.14)
226. Keisuke Hirata; Kentaro Kuga; Masaharu Matsunami; Minyue Zhu; Joseph P. Heremans; Tsunehiro Takeuchi, "Magneto-thermal conductivity effect and enhanced thermoelectric figure of merit in  $\text{Ag}_2\text{Te}$ ", *AIP Advances* **13**, 015016 (2023); <https://doi.org/10.1063/5.0131326> (IF=1.69)
225. Ken-ichi Uchida and Joseph P. Heremans, "Thermoelectrics: from Longitudinal to Transverse", *Joule*, **6**, 1–6, (2022); <http://doi.org/10.1016/j.joule.2022.08.016> (IF= 46.048)
224. Michael R. Scudder, Karl G. Koster, Joseph P. Heremans, and Joshua E. Goldberger, "Adiabatic and Isothermal Configurations for  $\text{Re}_4\text{Si}_7$  Transverse Thermoelectric Power Generators", *Appl. Phys. Rev.* **9**, 021420 (2022); <https://doi.org/10.1063/5.0073354> (IF=19.16)
223. Erica M. Moscarello, Brandi L. Wooten, Hasnain Sajid, Logan D. Tichenor, Joseph P. Heremans, Matthew A. Addicoat, and Psaras L. McGrier, "Thermal Conductivity of Two-Dimensional Benzobisoxazole-Linked Covalent Organic Frameworks with Nanopores: Implications for Thermal Management Applications" *ACS Appl. Nano Mater.* <http://doi.org/10.1021/acsanm.2c01389> (June 10, 2022) (IF=5.64)
222. Yu Pan, Congcong Le, Bin He, Sarah J. Watzman, Mengyu Yao, Johannes Gooth, Joseph P. Heremans, Yan Sun, Claudia Felser, "Giant anomalous Nernst signal in the antiferromagnet  $\text{YbMnBi}_2$ ", *Nature Materials* **21**, 203–209 (2022) <http://doi.org/10.1038/s41563-021-01149> (IF=47.656)
221. Joon Sang Kang, Dung Vu and Joseph P. Heremans, "Identifying the Dirac point composition in  $\text{Bi}_{1-x}\text{Sb}_x$  alloys using the temperature dependence of quantum oscillations", *Journal of Applied Physics* **130**, 225106 (2021); <https://doi.org/10.1063/5.0068312> (IF=2.887)
220. Bin He, Cüneyt Şahin, Stephen R. Boona, Brian C. Sales, Yu Pan, Claudia Felser, Michael E. Flatté and Joseph P. Heremans, "Large magnon-induced anomalous Nernst conductivity in single-crystal  $\text{MnBi}$ ", *Joule* **5** 1-11 (2021), <http://doi.org/10.1016/j.joule.2021.08.007> (IF=46.048)
219. Dung Vu, Wenjuan Zhang, Cüneyt Şahin, Michael E. Flatté, Nandini Trivedi, Joseph P. Heremans, "Thermal chiral anomaly in the magnetic-field induced ideal Weyl phase of  $\text{Bi}_{1-x}\text{Sb}_x$  topological insulators", *Nature Materials* **20**, 1525–1531 (2021) <http://doi.org/10.1038/s41563-021-00983-8> (2021). (IF=47.656)

218. Núria Bagués, Brandi L. Wooten, Bin He, Brian C. Sales, Joseph Heremans and David McComb, "Lorentz Transmission Electron Microscopy Imaging of Magnetic Textures in MnBi", *Microsc. Microanal.* **27** (Suppl 1), 2178-2179 (2021) <http://doi.org/0.1017/S1431927621007832> (IF=3.414)
217. Joseph P. Heremans: "Thermal spin transport and spin in thermoelectrics", in Proceedings of the International School of Physics "Enrico Fermi", Course **207**, "Advances in Thermoelectricity: Foundational Issues, Materials and Nanotechnology", edited by D. Narducci, G. J. Snyder and C. Fanciulli (IOS Press, Amsterdam; SIF, Bologna), pp. 171-212 (2021). <http://doi.org/10.3254/ENFI210012>
216. Michael R. Scudder, Bin He, Yaxian Wang, Akash Rai, David G. Cahill, Wolfgang Windl, Joseph P. Heremans, and Joshua E. Goldberger Highly Efficient Transverse Thermoelectric Devices with Re<sub>4</sub>Si<sub>7</sub> Crystals" *Energy and Environmental Science* **14**, 4009-4017 (2021) <http://doi.org/10.1039/D1EE00923K> (IF=36.04)
215. Ochs, Andrew; Gorai, Prashun; Wang, Yaxian; Scudder, Michael; Koster, Karl; Moore, Curtis; Stevanović, Vladan; Heremans, Joseph; Windl, Wolfgang; Toberer, Eric; Goldberger, Joshua, "Computationally-Guided Discovery of Axis-Dependent Conduction Polarity in NaSnAs Crystals", *Chemistry of Materials* **33**, 3, 946-951 (2021), <http://doi.org/10.1021/acs.chemmater.0c04030> (IF=9.576)
214. Brandi L. Wooten, Koen Vandaele, Stephen R. Boona and Joseph P. Heremans, "Combining Spin-Seebeck and Nernst Effects in Aligned MnBi/Bi Composites", *Nanomaterials* **10**, 2083 (2020); <http://doi.org/10.3390/nano10102083> (IF=4.342)
213. Michael J. Adams and Joseph P. Heremans, "Thermoelectric composite with enhanced figure of merit via interfacial doping", *Functional Composite Materials* 1:2 (2020) <http://doi.org/10.1186/s42252-020-00004-y>
212. Wang, Yaxian; Koster, Karl; Ochs, Andrew; Scudder, Michael; Heremans, Joseph; Windl, Wolfgang; Goldberger, Joshua, "The Chemical Design Principles for Axis-dependent Conduction Polarity", *Journal of the American Chemical Society* **142**(6):2812-2822 (2020) <http://doi.org/10.1021/jacs.9b10626> (IF=14.695)
211. Matthias Schrade, Kristian Berland, Andrey Kosinskiy, Joseph P. Heremans, Terje G. Finstad, Shallow Impurity Band in ZrNiSn", *J. Appl. Physics* **127** 045103 (2020) (IF=2.328)
210. Y. Zheng, T. Lu, Md M. H. Polash, M. Rasoulianboroujeni, N. Liu, M. E. Manley, Y. Deng, P. J. Sun, X. L. Chen, R. P. Hermann, D. Vashaee, J. P. Heremans, and H. Zhao, "Paramagnon drag in high thermoelectric figure of merit Li-doped MnTe", *Science Advances*, **5**, eaat9461, (2019); <http://doi.org/10.1126/sciadv.aat9461> (IF=14.136)
209. Yuanhua Zheng, Elan J. Weiss, Nikolas Antolin, Wolfgang Windl, and Joseph P. Heremans, "Magnon drag effect in Fe-Co alloys", *J. Appl. Phys.* **126**, 125107 (2019); <https://doi.org/10.1063/1.5117165> (IF=2.328)
208. Stephen R. Boona, Brandi Wooten, Koen Vandaele and Joseph P. Heremans, "Co-evolution of Microstructure and Magnetic Properties in Magnetically Aligned MnBi-Bi Composites", *Microsc. Microanal.* **25** (Suppl 2), 1710-1711 (2019) doi:10.1017/S1431927619009280
207. Adams, M. J., Verosky, M., Zebarjadi, M., and Heremans, J. P., "Active Peltier Coolers based on Correlated and Magnon-drag Metals," *Phys. Rev. Appl.* **11**, 054008 (2019) (IF=4.782).
206. He, B., Wang, Y., Arguilla, M. Q., Cultrara, N. D., Scudder, M. R., Goldberger, J. E., Windl, W., and Heremans, J. P., "The Fermi Surface Geometrical Origin of Axis-Dependent Conduction Polarity in Layered Materials," *Nature Materials* **18** 568-572 (2019) (<https://doi.org/10.1038/s41563-019-0309-4>) (IF=39.737).
205. Adams, M. J., Verosky, M., Zebarjadi, M., and Heremans, J. P., "High Switching Ratio Variable-temperature Solid-state Thermal Switch Based on Thermoelectric Effects," *Int. J. Heat Mass Transf.* **134**, 114-118 (2019) (<https://doi.org/10.1016/j.ijheatmasstransfer.2018.12.154>) (IF=3.891).
204. Sola, A., Basso, V., Kuepferling, M., Pasquale, M., Carsten née Meier, D., Reiss, G., Kuschel, T., Kikkawa, T., Uchida, K., Saitoh, E., Jin, H., Watzman, S. J., Boona, S. R., Heremans, J. P., Jungleich, M. B., Zhang, W., Pearson, J. E., Hoffmann, A., and Schumacher, H. W., "Spin caloritronic Measurements: A Round Robin Comparison of the Longitudinal Spin Seebeck Effect," *IEEE Trans. Instrum. Meas.* **68** 1765-1773 (2019) (<https://dx.doi.org/10.1109/TIM.2018.2882930>) (IF=2.794).
203. Jin, H. and Heremans, J. P., "Optimization of the Figure of Merit in Bi<sub>1-x</sub>Sb<sub>x</sub>/Al<sub>2</sub>O<sub>3</sub> Nanocomposites," *Phys. Rev. Mater.* **2**, 115401 (2018) (<https://doi.org/10.1103/PhysRevMaterials.2.115401>).
202. Vandaele, K., Otsuka, M., Hasegawa, Y., and Heremans, J. P., "Confinement Effects, Surface Effects, and Transport in Bi and Bi<sub>1-x</sub>Sb<sub>x</sub> Semiconducting and Semimetallic Nanowires," *J. Phys.: Condens. Matter* **30** 403001 (2018) (<https://doi.org/10.1088/1361-648X/aada9b>) (IF=2.617).
201. Beens, M., Heremans, J. P., Tserkovnyak, Y., and Duine, R., "Magnons Versus Electrons in Thermal Spin Transport through Metallic Interfaces", *J. Phys. D: Appl. Phys.* **51** 394002 (2018) (<https://doi.org/10.1088/1361-6463/aad520>) (IF=2.373).

200. McCormick, T. M., Watzman, S. J., Heremans, J. P., and Trivedi, N., "Fermi Arc Mediated Entropy Transport in Topological Semimetals," *Phys. Rev. B* **97**, 195152 (2018) (<http://dx.doi.org/10.1103/PhysRevB.97.195152>) (IF = 3.718).
199. Watzman, S. J., McCormick, T. M., Shekhar, C., Wu, S.-C., Sun, Y., Prakash, A., Felser, C., Trivedi, N., and Heremans, J. P., "Dirac Dispersion Generates Unusually Large Nernst Effect in Weyl Semimetals," *Phys. Rev. B* **97**, 161404(R) (2018) (<http://dx.doi.org/10.1103/PhysRevB.97.161404>) (IF = 3.718).
198. Zhang, Y., Neal, A., Xia, Z., Joishi, C., Johnson, J. M., Zheng, Y., Bajaj, S., Brenner, M., Dorsey, D., Chabak, K., Jessen, G., Hwang, J., Mou, S., Heremans, J. P., and Rajan, S., "Demonstration of High Mobility and Quantum Transport in Modulation-doped  $\beta$ -(Al<sub>x</sub>Ga<sub>1-x</sub>)<sub>2</sub>O<sub>3</sub>/Ga<sub>2</sub>O<sub>3</sub> Heterostructures," *Appl. Phys. Lett.* **112**, 173502 (2018) (<http://dx.doi.org/10.1063/1.5025704>) (IF = 3.411).
197. Vandaele, K., He, B., Van Der Voort, P., De Buysser, K., and Heremans, J. P., Wet-Chemical Synthesis of Enhanced-Thermopower Bi<sub>1-x</sub>Sb<sub>x</sub> Nanowire Composites for Solid-State Active Cooling of Electronics, *Phys. Rev. Applied* **9**, 024020 (2018) (<http://dx.doi.org/10.1103/PhysRevApplied.9.024020>) (IF = 4.808).
196. Prakash, A., Flebus, B., Brangham, J., Yang, F., Tserkovnyak, Y., and Heremans, J. P., "Evidence for the Role of the Magnon Energy Relaxation Length in the Spin Seebeck Effect," *Phys. Rev. B* **97**, 020408(R) (2018) (<https://doi.org/10.1103/PhysRevB.97.020408>) (IF = 3.718).
195. Yang, Z., Codecido, E. A., Marquez, J. Zheng, Y., Heremans, J.P., Myers, R. C., "Scalable Nernst Thermoelectric Power Using a Coiled Galfenol Wire," *AIP Advances* **7**, 095017 (2017) (<http://dx.doi.org/10.1063/1.5003611>) (IF = 1.568).
194. Vandaele, K., Heremans, J. P., Van Driessche, I., Van Der Voort, P., and De Buysser, K., "Continuous-feed nanocasting process for the synthesis of bismuth nanowire composites", *Chem. Commun.* **53**, 12294-12297 (2017) (<http://dx.doi.org/10.1039/C7CC04499B>) (IF = 6.567).
193. Heremans, J. P., "A New Member of the Hall Family," *Nature Materials* **16**, 968-9 (2017) (<http://dx.doi.org/10.1038/nmat5002>) (IF=47.656).
192. Stockert, U., Dos Reis, R., Ajesh, M. O., Watzman, S., Schmidt, M., Shekhar, C., Heremans, J. P., Felser, C., Baenitz, M., Nicklas, M., "Thermopower and Thermal Conductivity in the Weyl Semimetal NbP," *J. Phys. Cond. Matter* **29**, 325701 (2017) (<http://dx.doi.org/10.1088/1361-648X/aa7a3b>) (IF = 2.649).
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#### **Plenary and Invited talks**

100. "Transverse thermoelectrics based on goniopolar and topological materials", Plenary talk, 39<sup>th</sup> International Conference on Thermoelectrics, Seattle, WA, USA June 21st - 25th, 2023.
99. "Ferron heat currents in displacement ferroelectrics", Invited talk, Spin Caloritronics XII conference, Tsukuba, Japan, May 23, 2023
89. "Solid-state thermal to electrical energy conversion: thermoelectrics and beyond", 3<sup>rd</sup> e-Symposium on Carbon-free Energy Technology: Thermal and Hydrogen Aspect, Korean Advanced Institute for Science and Technology (KAIST), December 1 2, 2022
88. "Giant Nernst and Thermal Hall Effects in the Weyl Phase of Bi<sub>1-x</sub>Sb<sub>x</sub> Topological Insulators" Invited talk EQ01.02.01, Materials Research Society Fall Meeting, Boston, MA, November 28- -December 2, 2022
87. "The Bi(1-x)Sb(x) topological insulator/Weyl semimetal system: chiral anomalies, anomalous Nernst effect, giant thermal Hall effect", Northern Lights Conference 22 on Spin, Topology and Superconductivity, Reykjavík, Iceland, October 12-15, 2022

86. "Polarization caloritronics: electric field dependence of the thermal conductivity and diffusivity of lead zirconium titanate", Spin Caloritronics XI, University of Illinois Urbana-Champaign, Urbana, IL, May 23-27, 2022
85. "Goniopolar Thermoelectrics", Invited talk SF15.02.01, Materials Research Society Spring Meeting, Honolulu, HI, May 7-13, 2022
84. "Thermal Chiral Anomaly in the magnetic-field induced Weyl phase of Bi(1-x)Sb(x) alloys", Invited talk Z44.00001, American Physical Society March meeting, Chicago, IL, March 14-18, 2022.
83. "The Thermal Chiral Anomaly in ideal field-induced Weyl semimetals" SPICE, University of Mainz, Germany, 21 January 2021
82. "Thermal analog to the chiral anomaly and thermal Hall effect in the field-induced Weyl semimetal Bi<sub>89</sub>Sb<sub>11</sub> in the ultra-quantum limit" Invited Talk, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, November 18-22, 2019
81. "Transport in Goniopolar and (pxn) Metals," Invited Talk, AVS 66<sup>th</sup> International Symposium & Exhibition, Columbus, OH, October 20, 2019.
80. "Prospects for Boson-based energy converters", Plenary talk, ICT2019 - 38th International Conference on Thermoelectrics, Gyeongju, South Korea, July 1, 2019
79. "Thermal transport in the field-induced Weyl semimetal Bi<sub>89</sub>Sb<sub>11</sub> ", Dung Vu, Wenjuan Zhang, Cüneyt Şahin, Nandini Trivedi, Michael Flatté, Joseph P. Heremans, SpinTech X, Chicago, IL, 26 June 2019
78. "Spin-Seebeck effect in the organic ferromagnet VTCNE vanadium tetracyanoethylene", Yuanhua Zheng Ezekiel Johnston-Halperin, Seth Kurfman, Andrew Franson, Audrey Chamoire, Spin Caloritronics X, May 20, 2019, Groningen, NL
77. "Thermal conductivity of Weyl semimetals", Dung Vu, Wenjuan Zhang, Cüneyt Şahin, Nandini Trivedi, Michael Flatté, Joseph P. Heremans, Spring MRS meeting Invited Talk QN05.08.01, April 24, 2019, Phoenix, AZ
76. "Paramagnon Drag as a Route to High ZT", Y. Zheng, M. Rasoulianboroujeni, T. Lu, M. H. Polash, N. Liu3, R. P. Hermann, M. E. Manley, D. Vashaee, Huaizhou Zhao, April 23 2019  
Spring MRS session Invited talk EP13-03-01, Phoenix, AZ,
75. "Thermal spin transport", Workshop on Frontiers in Thermal Transport and Energy Conversion, National Academy of Sciences Condensed Matter and Materials Research Committee April 11, 2019 Meeting
74. "Conveyor-belt Entropy Transport in a Weyl Semimetal," J. P. Heremans, D. Vu, N. Trivedi, W. Zhang, M. Flatté, C. Şahin, Spin Mechanics 6, Sendai, Japan, February 27, 2019.
73. "Nernst Thermopower in Bi-MnBi Composites," J. P. Heremans, K. Vandaele, B. He, S. Boona, Materials Research Society Fall Meeting, Boston, MA, November 28, 2018.
72. "Principles of Spin-based Solid-state Heat-to-Electricity Conversion," Daniel C. Tsui Lecture, Physics Series, Institute of Physics, Chinese Academy of Sciences, Beijing, China, October 8, 2018.
71. "High ZT in MnTe via Spin Physics," J. P. Heremans, Y. Zheng, H. Zhao, T. Lu, N. Liu, P.J. Sun, W. Wang, M. Rasoulianboroujeni, D. Vashaee, International Conference on Thermoelectrics, Caen, France, July 1, 2018.
70. "Spin-enhanced Thermopower and Nernst Effects in Metals and Semiconductors," Y. Zheng, B. He, M. Adams, S. J. Watzman, K. Vandaele, B. Flebus, W. Windl, R. Duine, Y. Tserkovnyak, D. Vashaee, and J. P. Heremans (given by Heremans), Spin Caloritronics IX, Columbus, OH, June 26, 2018.
69. "Professor Dresselhaus' Contribution to Thermoelectrics Research," MRS Fall meeting, Boston, MA, November 27, 2017.
68. "Professor Dresselhaus' Contribution to Thermoelectrics Research" Celebrating Our Millie: The Legacy and Impact of Mildred Dresselhaus Symposium, MRS Fall Meeting, Boston, MA, November 26, 2017.
67. "Entropy Transport in Weyl Semimetals," J. P. Heremans, S. J. Watzman, T. M. McCormick, C. Shekhar, S.-C. Wu, Y. Sun, C. Felser, and N. Trivedi (given by Heremans), Antiferromagnetic Spintronics, Grenoble, France, October 25-27, 2017.
66. "Signatures of Dirac and Weyl Physics in Thermal Transport Properties," J. P. Heremans, S. J. Watzman, T. M. McCormick, N. Trivedi, K. Manna, C. Shekhar, and C. Felser (given by Heremans), Spin, Charge, and Energy Transport in Novel Materials, Hvar, Croatia, October 1-8, 2017.
65. "Entropy Transport in Weyl Semimetals with Topologically Protected Charge Carriers," 9<sup>th</sup> US-Japan Joint Seminar on Nanoscale Transport Phenomena, Tokyo, Japan, July 3, 2017.

64. "Thermal Transport in Weyl Semimetals," Spin Caloritronics 8, Regensburg, Germany, June 15, 2017.
63. "Dirac Dispersion Generates Large Nernst Effect in Weyl Semimetals," S. J. Watzman, T. M. McCormick, C. Shekhar, S.-C. Wu, Y. Sun, A. Prakash, C. Felser, N. Trivedi, and J. P. Heremans (given by Heremans), Workshop on Spins, Valleys, and Topological States in 2D and Layered Materials, Columbus, OH, June 7, 2017.
62. "Magnon Drag, Induced and Direct," Spin Coherence, Condensation, and Superfluidity, University of California Gump Station, Moorea, French Polynesia, February 16, 2017
61. "Magnon Mediated Phonon Drag in YIG/Metal Systems," (given by Prakash) Spin Coherence, Condensation, and Superfluidity, University of California Gump Station, Moorea, French Polynesia, February 16, 2017.
60. "Spin in Thermoelectrics: From Spin-Seebeck to Magnon Drag," Tutorial, Spin Caloritronics 7, Utrecht, Netherlands, July 12, 2016.
59. "Thermoelectrics Research in the Thermal Materials Laboratory," (invited, given by Watzman) International Thermoelectrics Summer School, Golden, CO, July 2016.
58. "Introduction to Cryogenic Solid State Cooling," SPIE Defense + Cooling, Baltimore, MD, April 20, 2016.
57. "BiSb and Spin-related Thermoelectric Phenomena," SPIE Defense + Cooling, Baltimore, MD, April 20, 2016.
56. "Thermoelectric and Spin-Caloritronic Coolers: From Basics to Recent Developments," SPIE Photonics West Conference, San Francisco, CA, February 17, 2016.
55. "Magnetic Field Dependence of Phonon Heat Transport," Materials Research Society Fall Meeting, Boston, MA, November 30, 2015.
54. "Thermoelectric and Spin-Thermal Solid-State Energy Conversion," Exploration of Novel Complex Materials Fall Seminar Series, The Ohio State University, Columbus, OH, October 7, 2015.
53. "Using the Spin Degree of Freedom in Solid State Thermal Energy Conversion," Spin Thermal Workshop, The Ohio State University, Columbus, OH, September 16, 2015.
52. "The effect of the Spin Degree of Freedom on Solid State Heat-to-Electricity Converters," American Chemical Society, Summer Meeting, Boston, MA, August 15, 2015.
51. "Adding the Spin Degree of Freedom to Thermoelectrics," International Thermoelectrics Conference, Dresden, Germany, June 29, 2015.
50. "Temperature Dependence of Magnon Thermal Conductivity, Spin-Seebeck Effect, and Magnon Drag," SpinMechanics 3 Workshop, Munich, Germany, June 25, 2015.
49. "Thermoelectric and Spin Thermal Solid State Energy Conversion," Institute for Materials Research Materials Week, Columbus, OH, May 14, 2015.
48. "Thermally Induced Spin Fluxes," Department of Energy Static and Dynamic Interfacial Effects in Magnetism Workshop, Washington, D.C., April 14, 2015.
47. "Solid State Thermal-to-Electrical Energy Conversion: Progress in Thermoelectricity and Spin Caloritronics," Advanced Institute for Materials Research International Symposium 2015, Tohoku University, Sendai, Japan, February 18, 2015.
46. "Magnetic Properties of Phonons," Spin Caloritronics VI Conference, Irsee, Germany, July 2014.
45. "Phonon Diamagnetism," International Conference on Thermoelectrics, Nashville, TN, July 7, 2014.
44. "Thermal Properties of Magnons and Magnetic Properties of Phonons," Spin Mechanics, Sendai, Japan, June 2014.
43. "Heat Transport by Magnons, Phonon-drag, and the Spin Seebeck Effect," Kavli Institute for Theoretical Physics, Concepts in Spintronics Conference, Santa Barbara, CA, September 30-October 5, 2013
42. "Thermoelectric and Spin Caloritronics Solid-state Energy Conversion," Plenary opening lecture, TEP-CH 2013 Synthesis and function of Thermoelectric Materials Conference, EMPA (Swiss Federal Laboratories for Materials Science and Technology), Überlandstrasse 129, 8600 Dübendorf, Switzerland, Sept. 16-19 2013.
41. "The Spin Seebeck Effect and Thermomagnetic Signals in Bulk Metglass," Donostia International Conference on Nanoscaled Magnetism and Applications, San Sebastian, Spain, 9-13<sup>th</sup> September 2013.
40. "The Role of Phonons in the Spin Seebeck Effect," SPIE Optics and Photonics, Spintronics Symposium VI, San Diego, CA, August 25-29, 2013.
39. "Giant Spin Seebeck Effect and Phonon Drag in InSb," Gordon Research Conference, Spin Dynamics in Nanostructures, Hong Kong, China, August 18-21, 2013.

38. "The Spin Seebeck Effect: An Experimentalist's Point of View," SpinTech VI, Chicago, IL, July 28-31, 2013.
37. "Anharmonicity Engineering: Reducing the Lattice Thermal Conductivity," DOE-EFRC Principal Investigators' Meeting, Washington DC, July 18-19, 2013.
36. "Resonant Levels in Bulk Semiconductors," E-MRS (Materials Research Society), Strasbourg, France, May 26-30, 2013.
35. Spin Caloritronics V International Workshop, The Ohio State University, Columbus, Ohio, May 12-15, 2013.
34. "Spin Seebeck Effect and Magnon Thermal Conductivity," Spin Caloritronic Transport, Deutsche Forschungsgemeinschaft SPP 1538 meeting, Bad Honnef, Germany, April 21-23, 2013.
33. "Thermoelectric and Spin-thermal Solid-State Energy Conversion," Fifth Annual International Workshop on Advanced Materials (IWAM), Ras Al Khaimah, United Arab Emirates, February 24-27, 2013.
32. "The Spin Seebeck Effect in Semiconductors," WIND conference, Kona, Hawaii, December 2-7, 2012.
31. "Semiconductors for thermoelectric and spin-thermal solid-state energy conversion," Nobel Symposium 153: Nanoscale Energy Converters, Örenäs Castle, Sweden, August 12-16, 2012.
30. "The Spin-Seebeck Effect in Semiconductors: GaMnAs & InSb," Tutorial lecture, The 7<sup>th</sup> International Conference on Physics and Applications of Spin-related Phenomena in Semiconductors, Eindhoven, the Netherlands, August 5, 2012.
29. "Electron Transport," Lecture, Summer School on Thermoelectricity, Centre National de la Recherche Scientifique (CNRS), Ventron, France, July 3 and July 5, 2012.
28. "Giant Spin-Seebeck Effect in InSb under Quantizing Magnetic Fields," J.P. Heremans, C. M. Jaworski, E. Johnston-Halperin, and R.C. Myers, Invited talk, Spin Caloritronics Workshop –IV, Tohoku University, Sendai, Japan, June 3, 2012.
27. "Quantum Spin-Seebeck Effect," 2<sup>nd</sup> ASRC International Workshop on Magnetic Materials and Nanostructures, Japanese Atomic Energy Agency, Tokai, Japan, January 11, 2012.
26. "Resonant Levels in Thermoelectric Semiconductors," Keynote Presentation, 7<sup>th</sup> US-Japan Joint Workshop on Nanoscale Transport, Shima, Japan, December 16, 2011.
25. "Spin-Seebeck, Phonon-drag and Phonon Transport in GaMnAs," 56<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials, Scottsdale, AZ, Oct 30 – Nov 3, 2011.
24. "Spin-Seebeck versus Charge-Seebeck: Perspective, Prospects and Problems," Opening Lecture, Spin Caloritronics III, Lorentz International Center for Workshops in Sciences, University of Leiden, Leiden, NL, May 9-13, 2011.
23. "Giant Seebeck Coefficient in Organic-based Magnetic Semiconductor V(TCNE)<sub>x</sub>," Audrey Chamoire, Christopher Jaworski, Chi-Yueh Kao, Arthur Epstein, and Joseph Heremans, Invited talk, European Materials Research Society Meeting, Nice, France, May 9-13, 2011.
22. "The Spin-Seebeck Effect, and Experimentalist's Point of View," Materials Research Society Spring Meeting, San Francisco, CA, April 29, 2011.
21. "Resonant Levels and the Thermoelectric Figure of Merit," American Physical Society March Meeting, Dallas, TX, March 25, 2011.
20. "Optimization of the Efficiency of Thermoelectric Energy Converters," European Science Foundation Workshop on Nanotechnology for Sustainable Energy, M. Graetzel and J-M. Tarascon, Organizers, Obergurgl, Austria, July 7, 2010.
19. "Resonant Levels Increase the Thermoelectric Figure of Merit," The 29<sup>th</sup> International Conference on Thermoelectrics, Shanghai, China, May 31-June 3, 2010.
18. "The Spin Seebeck Effect in Semiconductors," Shanghai International Workshop on High Performance Ceramics, Hangzhou, China, May 27-30, 2010.
17. "Enhancing the Thermoelectric Figure of Merit in Bulk Semiconductors," Meeting of the American Vacuum Society, November 11, 2009.
16. "Resonant Impurity Levels can Enhance the Thermoelectric Figure of Merit," Invited talk N6.6, Materials Research Society Spring Meeting, San Francisco CA, April 13-17, 2009.
15. "Enhancement of the Thermoelectric Figure of Merit by Distortions of the Dispersion Relation," Invited talk (L28.00001), Meeting of the American Physical Society, Pittsburgh, PA, Bull. Am. Phys. Soc. **54**, L28.00001, March 16-23, 2009).
14. Invited talk, 26<sup>th</sup> International Conference on Thermoelectricity, Corvallis, Oregon, August 2-7, 2008.
13. "Nanoscale Thermoelectricity," XVI Ural International Winter School on the Physics of Semiconductors, Ekaterinburg, Russia, organized by the Russian Academy of Sciences, Feb. 27 - Mar. 4, 2006.

12. "Low-dimensional Thermoelectricity," XXXIV International School on the Physics of Semiconducting Compounds, Jaszowiec, Poland, June 4 - 10, 2005.
11. "Thermoelectric Power, Electrical Resistance, Magnetoresistance and Optical Reflectivity of Bismuth Nanowire composites," Fall meeting, Material Research Society, Boston, MA, December 1, 2003.
10. "Review of Thermoelectric and Galvanomagnetic Properties of Bismuth Nanowires," Invited Talk at the 22<sup>nd</sup> International Conference on Thermoelectrics, La Grande Motte, France, Aug. 17-21, 2003.
9. "Magnetic Field Sensors for Position Sensing in Automotive Applications," Invited talk, Spring meeting, Materials Research Society, San Francisco CA, April 1997.
8. "Magnetic Field Sensors for Position Sensing in Automotive Applications," Invited talk, 16th Annual Conference on Properties and Applications of Magnetic Materials, Chicago, IL, May 12-14, 1997.
7. "Solid-State Magnetic Field Sensors and Automotive Application," Invited talk, IV International Conference on Advanced Materials, Cancun, Mexico, August 1995.
6. "Electronic Properties of Carbon Nanotubes," Invited paper, Spring Meeting of the Materials Research Society, San Francisco, April, 1995.
5. "Narrow-gap Semiconductor Magnetic Field Sensors and Applications," Invited paper, International Conference on Narrow Gap Semiconductors, Southampton, UK, July 1992.
4. "Two-dimensional Electron Gas Magnetic Field Sensors," Invited paper, March meeting, American Physical Society, Anaheim Ca, Bull. Am. Phys. Soc. **35** 191, March 1990.
3. "Thermal Properties of High-Tc Materials," Invited paper, workshop on high temperature superconductivity, University of Alabama, May 23-25, 1989. Proceedings (PR-89-02) published by GACIAC, IITRI, 10 W. 35th street, Chicago, IL 60616.
2. "The Influence of Heat-treatment of Graphite Fibers on Their Intercalation with Sulfuric Acid," Invited paper, International Symposium on Graphite Intercalation Compounds, Tsukuba, Japan, March 1985.
1. "Transport Properties of Graphite Fibers: 2-D Behavior and Disorder," Invited paper, March Meeting, American Physical Society, Bull. Am. Phys. Soc. **30**, p. 588, March 1985.

**Colloquia, lectures and seminars:**

81. J. P. Heremans "Solid-state thermal to electrical energy conversion: thermoelectrics and beyond", Seminar, Mechanical and Materials Engineering department, University of Cincinnati, Cincinnati, OH, 30 March 2023
80. J. P. Heremans, "Thermal and thermoelectric properties of topologically non-trivial crystals", Seminar organized by J-C Zhao, University of Maryland, Department of Mechanical and Aerospace Engineering, 22 October 2021
79. J. P. Heremans, "Topology in electron band structures", Seminar organized by Carlos Castro, Ohio State University, Department of Mechanical and Aerospace Engineering, 30 September 2021
78. J. P. Heremans, "Thermal and thermoelectric properties of topologically non-trivial crystals", Seminar, University of Illinois, Department of Material Science and Engineering, 21 September 2021
77. "The Thermal Chiral Anomaly in ideal field-induced Weyl semimetals", Waterloo Institute for Nanotechnology (WIN) Distinguished Lecture, University of Waterloo, Ontario, Canada, 22 September 2020
76. "Thermal transport: from basic research to applications", Walker Department of Mechanical Engineering, University of Texas, Austin TX, 21 August 2020.
75. "Thermal chiral anomaly in the magnetic-field induced ideal Weyl phase of Bi<sub>1-x</sub>Sb<sub>x</sub> topological insulators", Quantum Matter Seminar, Physics Department, Ohio State University, Columbus OH, Monday June 22, 2020
74. "Principles of spin-based solid-state heat-to-electricity conversion", Institute of Condensed Matter Nanosciences, Catholic University of Louvain, Belgium, 7 February 2020.
73. "Thermal magneto-conductivity and thermal Hall effect in field-induced Weyl semimetals", Physics Department, Brown University, Providence, RI, January 30, 2020
72. "Thermal Effects of Topologically Non-trivial Fermi Surfaces: Thermal Chiral Anomaly and Goniopolar Materials", Department of Materials Science, University of Maryland, College Park MD, October 11, 2019.
71. Four lectures at the International School of Physics "Enrico Fermi" - course 207, ADVANCES IN THERMOELECTRICITY: FOUNDATIONAL ISSUES, MATERIALS AND NANOTECHNOLOGY, Varenna (Lake Como) 15 - 20 July 2019. Titles: "Lecture 1: Thermodynamics of Magnetism"; "Lecture 2: Spin Transport"; "Lecture 3: Topological Materials"; and "Error bars in measurements"

70. "Spin Based Thermoelectrics", Pohang Institute of Technology, Pohang, South Korea, July 5, 2019
69. "The Thermal Chiral Anomaly in field-induced Weyl semimetals." Oak Ridge National Labs Colloquium May 14, 2019, Oak Ridge, TN
68. "Entropy Transport in Weyl Semimetals," Northwestern University, Evanston, IL, January 20, 2019.
67. "Solid-state Thermal-to-Electrical Energy Conversion" University of Minnesota, Minneapolis, MN, March 28, 2019.
66. "Principles of Solid-state Heat-to-Electricity Conversion Based on Spin," Y. Zheng, M. Rasoulianboroujeni, T. Lu, Md M. H. Polash, N. Liu, R. P. Hermann, M. E. Manley, H. Zhao, D. Vashaee, and J. P. Heremans (given by Heremans), Kavli Institute for Theoretical Sciences Workshop, Beijing, China, October 1, 2018.
65. "Solid-state Thermal-to-Electrical Energy Conversion" University of Houston, Houston, TX, February 9, 2018.
64. "Principles of Solid-State Heat-to-Electricity Conversion Based on Spin," University of California, Irvine, Irvine, CA, May 26, 2017.
63. "Principles of solid-state heat-to-electricity conversion based on spin," Graduate Seminar Series, Purdue University, West Lafayette, IN, November 17, 2016.
62. "Magnon-drag as a Pathway to High-efficiency Thermoelectric Metals, (invited, given by Watzman) Society of Women Engineers Graduate Rapid Fire Research Competition, Austin, TX, October 26, 2017.
61. "Berry Curvature-induced Huge Anomalous Nernst Effect in the Absence of Magnetic Field in the Time-reversal Symmetry-breaking Weyl Semimetal  $\text{YbMnBi}_2$ ," (invited, given by Watzman) University of Dayton Academic Research Colloquium, Dayton, OH, October 11, 2017.
60. "Spin Caloritronics and Spin in Thermoelectrics," The Professor Ctirad Uher Symposium, Ann Arbor, MI, October 7, 2016.
59. "Thermoelectric and Spin-Thermal Solid-State Energy Conversion," Seminar, West Virginia University, Morgantown, WV, February 5, 2016.
58. "Thermoelectric and Spin-Thermal Solid-State Energy Conversion," Seminar, University of Southern California, Los Angeles, CA, January 14, 2016.
57. "Thermal Properties of Magnons and Magnetic Properties of Phonons," Colloquium, Texas A&M University, College Station, TX, November 19, 2015.
56. "The spin degree of freedom in thermoelectrics," Symposium, Zhejiang University, Hangzhou, China, October 28, 2015.
55. "The Spin Degree of Freedom in Thermoelectrics," Symposium, University of Houston, Houston, TX, September 10, 2015.
54. "The Spin Degree of Freedom in Thermoelectrics," Symposium, Laboratoire de Physique et d'Étude des Matériaux, Paris-Sorbonne University, Paris, France, June 18, 2015.
53. "Thermoelectric and Spin Thermal Solid State Energy Conversion," Symposium, California Institute of Technology, Pasadena, CA, April 17, 2015.
52. "Thermoelectric and Spin-Thermal Solid-State Energy Conversion," Boston College, Newton, MA, October 28, 2014.
51. "Solid-state Heat Engines and Waste Heat Recovery," Winton Symposium on the Physics of Sustainability, Cavendish Laboratory, University of Cambridge, Cambridge UK, September 29, 2014.
50. "Transport de Chaleur via les Spins," Ecole de Transport, CNRS, Annecy, France, May 2014.
49. "Thermal Properties of Magnons and Magnon-Phonon Interactions" Spin Caloritronics VI, Irsee Germany, July 2014.
48. "Thermal Properties of Magnons and Magnetic Properties of Phonons," Spin Mechanics, Sendai, Japan, June 2014.
47. "Transport Electronique," Ecole de Transport, CNRS, Annecy, France, May 2014.
46. "Anharmonic Effects in Phonon Physics" I. Physikalisches Institut, Aachen, Germany, February 2014.
45. "Solid-State Thermal Energy Conversion," Purdue University, Special Joint Condensed Matter Physics and BIRCK Nanotechnology Center Seminar, Oct. 18, 2013.
44. "Zeeman Spin-Seebeck Effect," Institute for Materials Research, Tohoku University, Sendai, Japan, Jan. 16, 2012, invited by Prof. Eiji Saitoh.
43. "New Design Strategies for High-efficiency Thermoelectric Materials," Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland, July 6, 2011, invite by Prof. J-P. Ansermet.

42. "High-efficiency Thermoelectric Materials," Department of Mechanical Engineering, University of Texas, Austin, May 4, 2011, invited by Prof. Li Shi.
41. "Resonant Levels," Department of Electrical Engineering, University of California Santa Cruz, April 29, 2011, invited by Prof. Ali Shakouri.
40. "High-efficiency Thermoelectric Materials: New Design Strategies, New Applications," Physics Department, Missouri Science and Technology University, Rolla, MS, Feb. 9, 2011, invited by Prof. Julia Medvedeva.
39. The Spin-Seebeck Effect in Semiconductors, Dept. of Physics, University of Michigan, Nov. 16, 2010, invited by Professor Ctirad Uher.
38. "High-efficiency Thermoelectric Materials: New Design Strategies, New Applications," Dept. of Physics, Case Western Reserve University, Cleveland, OH, Sep. 23, 2010, invited by Prof. P. L. Taylor.
37. "Resonant Levels Improve the Thermoelectric Figure of Merit," University of Michigan, Energy Frontier Research Center for Solar and Thermal Energy Conversion, Ann Arbor MI, Aug. 4, 2010.
36. "Thermoelectric Energy Conversion," EMPA, Duebendorf, Switzerland, July 10, 2010, invited by Dr. Anke Weidenkaff.
35. "Designing Chemical Bonds to Enhance the Thermoelectric Figure of Merit," Seminar, Dept. of Materials Science, Zhejiang University, Hangzhou, China, May 28, 2010, invited by Prof. Xinbing Zhao.
34. "Designing Chemical Bonds to Enhance the Thermoelectric Figure of Merit," Seminar, Institute of Chemical Science and Engineering Faculty of Basic Science, Ecole Polytechnique Federale de Lausanne, Aug. 14, 2009, invited by M. Graetzel.
33. "Intrinsic Figure of Merit Enhancements in Bulk Semiconductors," North American Solid State Chemistry Conference, Ohio State University, June 18, 2009.
32. "High-performance Thermoelectric Materials without Complex Nanostructure," Michigan State University, Center for Nanomaterials Design (CNDA), June 23, 2008.
31. "Nanostructured and Atomically Designed Thermoelectric Materials," Stanford Photonics Research Center, Stanford University, June 25, 2008.
30. "AgSbTe<sub>2</sub>: Lead-free Lead Telluride, a New Thermoelectric Material," Physics Department, Michigan State University, Jan. 28, 2008, invited by S. J. Mahanti.
29. "Waste Heat Recovery," Ford Science and Innovation Center, April 25, 2007, invited by Clay Morrenville.
28. "Thermoelectric Nanomaterials," Ohio State University, given jointly to the Physics Department, the Department of Electrical Engineering and the Department of Mechanical Engineering, Dec. 1, 2004, invited by Prof. V. Subramanian.
27. "Transport Properties of Bismuth, Antimony and Zinc Nanowires," Ecole des Mines, Nancy, France, Nov. 7, 2003, invited by Prof. H. Scherrer.
26. "Transport Properties of Bismuth Nanowires," Physics Department, Wayne State University, Sep. 23, 2003, invited by Prof. Caroline Morgan.
25. "Transport in Bismuth Nanowires," Massachusetts Institute of Technology, Physics Department, Cambridge, MA 02139, Dec. 17, 2002, invited by Prof. M. S. Dresselhaus.
24. "Preparation and Transport Properties of Sb and Bi Nanowires," McMaster University, Hamilton, Ontario, Canada, April 10, 2000, invited by Professor H. R. Datars.
23. "Magnetic Position Sensors and Synthesis and Properties of Bismuth Nanowires," University of Illinois at Urbana-Champaign, Oct. 26, 1999, Professor Timothy N. Trick.
22. "Transport Properties of Bismuth Nanowires," Michigan State University, East Lansing, Nov. 13, 1998, invited by Professor J. Bass.
21. "Magnetic Field Sensors for Position Sensing in Automotive Applications," Invited talk at the 24th Annual Spring Symposium of the American Vacuum Society Meeting, Wayne State University, May 6, 1997.
20. "Temperature Dependence of Transport Properties of Mesoscopic Electron Devices," Condensed Matter Physics Seminar, Wayne State University, Detroit, MI, Feb. 7, 1995.
19. "Narrow-gap Semiconductor Magnetic Field Sensors and Applications," National Aeronautics and Space Administration, Cleveland, OH, July 9, 1992, invited by Dr. Amitava Banerjee.
18. "Narrow-gap Semiconductors for Automotive Applications," University of Michigan, Ann Arbor, MI, Sep. 27, 1991, invited by Professor Steve Yalisove.

17. "III-V Compound Semiconductors for Automotive Applications," Central Michigan University, Mt. Pleasant, MI, April 4, 1991, Society of Physics Students.
16. "III-V Compound Semiconductors for Automotive Applications," University of Maryland, College Park, MD, March 14, 1991, invited by Professor H. Dennis Drew.
15. "Two-dimensional Electron Gas Magnetic Field Sensors," Wayne State University, Detroit, MI, Sep. 5, 1990, invited by Professor Vladimir Mitin.
14. "Compound Semiconductors for Automotive Applications," Katolieke Universiteit Leuven, Leuven, Belgium, Nov. 20, 1989, invited by Dr. G. Borghs.
13. "Physics of Heterojunctions," Université Catholique de Louvain, Belgium, Nov. 13-24, 1989.
12. "Thermal Properties of High- $T_C$  Superconductors," Naval Research Laboratory, Washington, D.C., June 14, 1989.
11. "Thermal Properties of Oxide Superconductors," Physics Department, Michigan State University, June 5, 1989, invited by Professor D. Tomasek.
10. "Thermal Conductivity and Electron-phonon Interactions in Oxide Superconductors," Center for Materials Science and Engineering Colloquium, Massachusetts Institute of Technology, Feb. 12, 1988, invited by Professor John M. Graybeal.
9. "Electronic and Magnetic Properties of PbTe/EuTe Superlattices," Princeton University, Electrical Engineering Department, Oct. 12, 1987, invited by Professor M. Shayegan.
8. "Magnetic and Transport Properties of PbTe/PbEuSeTe Semiconductors and Heterojunctions," Brown University, Electrical Engineering Department, Sep. 1987, invited by Professor A.V. Nurmikko.
7. "PbTe / PbEuSeTe Quantum Wells," Oersted Institute, University of Copenhagen, Aug. 1986, invited by Professor O.P. Hansen.
6. "In-situ Expansion Measurements of Graphite Fibers during Intercalation with Sulfuric Acid," Institute for Solid State Physics, University of Tokyo, June 1985, invited by Professor N. Miura.
5. "Magnetostriction and Dependence of Carrier Densities on Magnetic Fields in Semimetals," Oersted Institute, University of Copenhagen, Aug. 18, 1982, invited by Professor O.P. Hansen.
4. "Magnetostriction in Bismuth and Graphite," Institute for atomic energy, University of Kyoto, April 1982, invited by Professor T. Morimoto.
3. "Thermal Conductivity of Graphite Intercalation Compounds," Institute for Solid State Physics, University of Tokyo, April 23, 1982, invited by Professor S. Tanuma.
2. "Thermal Transport in Tin-doped Bismuth," University of Michigan, Oct. 1980, invited by Professor C. Uher.
1. "Temperature Dependence of p-type Doping in Bismuth," Oersted Institute, University of Copenhagen, Aug. 1979, invited by Professor O.P. Hansen.

#### **Books:**

3. National Academies of Sciences, Engineering, and Medicine. 2019. *Frontiers of Materials Research: A Decadal Survey*, The National Academies Press, Washington, DC (L. H. Greene, T. Lubensky, M. V. Tirrell, P. M. Chaikin, H. Ding, K. T. Faber, P. T. Hammond, C. E. Heckle, K. J. Hemker, J. P. Heremans, B. A. Jones, N. Mason, T. Mason, T. S. Rahman, E. Reichmanis, J. L. Sarrao, S. B. Sinnott, S. Stemmer, S. I. Stupp, T. Benson Tolle, M. L. Weaver, T. Younkin, S. J. Zinkle, Eds.). <https://dx.doi.org/10.17226/25244>
2. Co-editor, Böer, K. W., *Survey of Semiconductor Physics*, John Wiley & Sons, New York (2002).
1. Jonker, B. T., Heremans, J. P., and Marinero, E. L., editors, *Growth, Characterization and Properties of Ultrathin Magnetic Films and Multilayers*. Mat. Res. Soc. Symp. Proc. **151**, Materials Research Society, Pittsburgh, PA (1989).

#### **Patent applications (other than those issued as patents):**

11. "Electrically controlled solid state thermal switch", Heremans J.P.; Wooten B. L., US Patent App. 17/932,087, March 30, 2023
10. "THERMOELECTRIC DEVICE UTILIZING NON-ZERO BERRY CURVATURE", Heremans; Joseph P.; (Upper Arlington, OH) ; Watzman; Sarah; (Cincinnati, OH) ; Trivedi; Nandini; (Columbus, OH) ;

- McCormick; Timothy; (Ashburn, VA) ; Felser; Claudia; (Halle, DE), US Patent Application 2020/0028060, January 23, 2020
9. "Thermoelectric alloys with improved thermoelectric power factor," Heremans, J. P., Jaworski, C. M., and Kulbachinskiy, V. A., U.S. Patent Application 2010/0258154; October 14, 2010.
  8. "Ternary Thermoelectric Materials and Methods of Fabrication," Heremans, J. P., Jovovic, V., and Morelli, D. T., U.S. Patent Application 2009/0235969; September 24, 2009.
  7. "Fluorescence detection system," Martin, E. W., Xu, R. X., Sun, D., Povoski, S. P., Heremans, J. P., Lee, R., Subramaniam, V. V., and Turro, C., U.S. Patent Application 2009/0234225; September 17, 2009.
  6. "Thermoelectric Figure of Merit Enhancement by Modification of the Electronic Density of State," Heremans, J. P. and Jovovic, V., U.S. Patent Application 2009/0178700; July 16, 2009.
  5. "Diesel fuel dilution level determination of diesel engine oil," Lin, Y., Heremans, J. P., and Wang, S-C. S., U.S. Patent Application 2007/0006642; January 11, 2007.
  4. "Tetraedrally-bonded oxide semiconductors for photoelectrochemical hydrogen production," Morelli, D. T. and Heremans, J. P., U.S. Patent Application 2006/0100100; May 11, 2006.
  3. "Moduläre Sensoranordnung und Verfahren zur Herstellung derselben," DE 101 46 156 A1 (Deutsches Patent- und Markenamt), Heremans, J. P., Schroeder, T.S., Moreno, D. J., Avila, F. J., Partin, D. L., Puleo, A., and Rodriguez, A. L. C.
  2. "Magnetic field sensor with tailored magnetic response," Heremans, J. P., Partin, D. L., and Schroeder, T. S., U.S. Patent Application 2002/0093332; July 18, 2002.
  1. "Magnetoresistors," Heremans, J. P., Partin, D. L., and Schroeder, T. S., U.S. Patent Application 2002/0050916; May 2, 2002.

#### Patent disclosures:

3. "Linear Magnetoresistors for Analog Magnetic Position Sensing," Heremans, J. P., Partin, D. L., and Schroeder, T. S., Research Disclosure 437076, Sep. 29, 2000, Delphi Automotive Systems.
2. "Magnetoresistors with Improved High-Temperature Sensitivity," Heremans, J. P., Research Disclosure 325112, May 15, 1991, General Motors.
1. "Accelerating the transient response of airflow sensor," Heremans, J. P. and Harrington, C., Research Disclosure 276112, General Motors.

#### Contributed Talks

198. "Thermoelectric and thermal transport in doped topologic al insulators Bi<sub>88</sub>Sb<sub>12</sub> and in its field-induced Weyl semimetal phase," M. Zhu, D. Vu, J. Kang, J.P. Heremans, Bulletin of the American Physical Society, APS March Meeting 2022, Chicago, IL, 2022, F50. 009
197. "Magneto thermal conductivity and thermal Hall conductivity of single crystal MnBi through the spin-reorientation temperature range," B. Wooten, N. Bagues Salguero, B. He, B. Sales, D. McComb, J.P. Heremans, Bulletin of the American Physical Society, APS March Meeting 2022, Chicago, IL, 2022, N72. 003
196. "Spin Seebeck Effect and Magnon Diffusion Length in Vanadium Tetracyanoethylene (V[TCNE]<sub>x</sub>), S. Kurfman, Y. Zheng, B. Wooten, D. Candido, M. Newburger, S. Cheng, R. Kawakami, M. Flatté, J. Heremans, E. Johnston-Halperin, Bulletin of the American Physical Society, APS March Meeting 2022, Chicago, IL, 2022, S72. 006
195. "Giant and tunable thermal chiral anomaly in the Weyl phase of semiconducting TI Bi<sub>1-x</sub>Sb<sub>x</sub> alloys," D. Vu, R. Nelson, B. Wooten, J. Goldberger, J.P. Heremans, Bulletin of the American Physical Society, APS March Meeting 2022, Chicago, IL, 2022, F50. 007
194. "Thermal signatures of strong magnon-phonon interactions in the canted anti-ferromagnetic phase of MnBi<sub>2</sub>Te<sub>4</sub>," D. Vu, R. Nelson, B. Wooten, J. Goldberger, J.P. Heremans, Bulletin of the American Physical Society, APS March Meeting 2022, Chicago, IL, 2022, K72. 006
193. "Re<sub>4</sub>Si<sub>7</sub>-Based Transverse Thermoelectric Generator with No Hot-Side Contacts", Joseph Heremans<sup>1</sup>, Michael Scudder<sup>1</sup>, Bin He<sup>1</sup>, Yaxian Wang<sup>1</sup>, Aksah Rai<sup>2</sup>, David Cahill<sup>2</sup>, Wolfgang Windl<sup>1</sup>, Joshua Goldberger, 2021 MRS Fall Meeting, December 2021, EN.10.02.01.

192. "Exciting transport properties of Ta<sub>2</sub>NiSe<sub>5</sub>," D. Vu, M. Scudder, J. Goldberger, and J. P. Heremans (given by Vu), APS March Meeting 2021, *Bull. Amer. Phys. Society* **66** C55.00010, March 15, 2021,
191. "Large zero-field Hall and Nernst effects and AMR in aligned MnBi / Bi composites," B. Wooten, K. Vandaele, S. Boona, and J. P. Heremans (given by B. Wooten), APS March Meeting 2021, March 15, 2021, *Bull. Amer. Phys. Society* **66** A38.00013
190. "Spin-Seebeck and anomalous Nernst effects in MnBi and Bi/MnBi composites," B. Wooten, K. Vandaele, B. He, S. R. Boona, B. C. Sales, C. Sahin, M. Flatté, J. P. Heremans (given by B. Wooten), APS March Meeting, Boston, MA, March 6, 2019.
189. "Thermal Switching via the Thermal Chiral Anomaly in the Magnetic-Field Induced Ideal Weyl Phase of Bi<sub>1-x</sub>Sb<sub>x</sub> Topological Insulators," D. Vu and J. P. Heremans (given by D. Vu), 2021 Virtual MRS Spring Meeting, April 18, 2021.
188. "Thermal Conductivity Study of Piezoelectric PZT Stack," Brandi Wooten and Joseph Heremans, (given by B. Wooten), 2021 Virtual MRS Spring Meeting, April 18, 2021.
187. "Magnon Drag and Spin Entropy Contribution to Thermopower of Li-doped MnTe," Y. Zheng, T. Lu, M. Rasoulianboroujeni, M. M. H. Polash, N. Liu, H. Zhao, D. Vashaee, and J. P. Heremans (given by Zheng), MRS Fall Meeting, Boston, MA, November 28, 2018.
186. "Nernst Thermopower in Bi-MnBi Composites," J. P. Heremans, K. Vandaele, B. He., and S. R. Boona (given by Heremans), MRS Fall Meeting, Boston, MA, November 28, 2018.
185. "Giant Anomalous Nernst Effect Observed in Single Crystal MnBi," B. He, S. R. Boona, B. Sales, and J. P. Heremans (given by He), MRS Fall Meeting, Boston, MA, November 28, 2018.
184. "Magnetically Driven Heat Transport in Field-induced Weyl Semimetals," D. Vu, K. Vandaele, N. Trivedi, and J. P. Heremans (given by Vu), MRS Fall Meeting, Boston, MA, November 28, 2018.
183. "Tools for Heat Management," (invited, given by Adams) Ford Motor Research, Dearborn, MI, November 15, 2018.
182. "High ZT in MnTe via Spin Physics" J. P. Heremans, Y. Zheng, H. Zhao, T. Lu, N. Liu, P.J. Sun, W. Wang, M. Rasoulianboroujeni, D. Vashaee (given by Heremans), International Conference on Thermoelectrics, Caen, France, July 1-4, 2018.
181. "Magnon Drag and Spin Entropy Contribution to Thermopower of Li-Doped MnTe," Y. Zheng, T. Lu, M. Rasoulianboroujeni, H. Zhao, D. Vashaee, and J. P. Heremans (poster by Zheng), Spin Caloritronics IX, Columbus, OH, June 26, 2018.
180. "Thermomagnetic Transport in Field-induced Weyl Semimetals," D. Vu, T. M. McCormick, K. Vandaele, N. Trivedi, and J. P. Heremans (poster by Vu), Spin Caloritronics IX, Columbus, OH, June 26, 2018.
179. "Nernst Thermopower in Bi-MnBi Composites," K. Vandaele, B. He, S. R. Boona, and J. P. Heremans (poster by Vandaele), Spin Caloritronics IX, Columbus, OH, June 26, 2018.
178. "Giant Anomalous Nernst Effect Observed in Single Crystal MnBi," B. He, S. R. Boona, B. Sales, and J. P. Heremans (poster by He), Spin Caloritronics IX, Columbus, OH, June 26, 2018.
177. "Application for Magnon Drag in Metal Thermoelectrics," M. Adams, E. Wells, S. J. Watzman, M. Verosky, and J. P. Heremans (poster by Adams), Spin Caloritronics IX, Columbus, OH, June 25, 2018.
176. "Thermomagnetic Transport in Field-induced Weyl Semimetals," (poster by Vu) NSF Site Visit, Columbus, OH, May 25, 2018.
175. "Magnetic Field Dependent Dirac Point and Thermomagnetic Transport in Bi<sub>1-x</sub>Sb<sub>x</sub> Alloys," (poster by Vu) Institute for Materials Research Materials Week, Columbus, OH, May 10, 2018.
174. "Thermopower and Nernst coefficients of binary alloys Fe-Co and Ni-Cr," (poster by Zheng) Institute for Materials Research Materials Week, Columbus, OH, May 10, 2018.
173. "Magnon Drag Thermopower of Antiferromagnetic Semiconductor Li Doped MnTe," (poster by Zheng) MURI Review, Columbus, OH, March 21, 2018.
172. "A New Classification for Axis Dependent Conduction Polarity," B. He, M. Scudder, Y. Wang, M. Q. Arguilla, N. Cultrara, J. E. Goldberger, W. Windl, and J. P. Heremans (given by He), APS Spring Meeting, Los Angeles, CA, March 9, 2018.
171. "Nernst Thermopower in Bismuth-Ferromagnetic Nanocomposites," K. Vandaele, B. He, S. R. Boona, and J. P. Heremans (given by Vandaele), APS Spring Meeting, Los Angeles, CA, March 8, 2018.

170. "Effect of Magnons on Interfacial Thermopower of YIG/Metal Heterostructures," A. Prakash, J. Brangham, S. J. Watzman, F. Yang, and J. P. Heremans (given by Heremans), APS Spring Meeting, Los Angeles, CA, March 6, 2018.
169. "Berry Curvature-induced Huge Anomalous Nernst Effect in the Absence of Magnetic Field in the Weyl Semimetal YbMnBi<sub>2</sub>," S. J. Watzman, K. Manna, T. M. McCormick, S. Guin, C. Shekhar, N. Trivedi, C. Felser, and J. P. Heremans (given by Watzman), APS Spring Meeting, Los Angeles, CA March 6, 2018.
168. "Magnon Drag Thermopower of the Antiferromagnetic Semiconductor Li Doped MnTe," Y. Zheng, T. Lu, M. Rasoulianboroujeni, H. Zhao, D. Vashaee, and J. P. Heremans (given by Zheng), APS Spring Meeting, Los Angeles, CA, March 5, 2018.
167. "Portable Combustion Generator with Integrated Thermoelectric/Heat Exchanger," M. Adams, Y. Zheng, and J. P. Heremans (given by Adams), APS Spring Meeting, Los Angeles, CA, March 5, 2018.
166. "Magnetic Field Dependent Dirac Point in Bi<sub>1-x</sub>Sb<sub>x</sub> Alloys: Magnetoresistance and Thermoelectric Properties," D. Vu, K. Vandaele, B. He, and J. P. Heremans (given by Vu), APS Spring Meeting, Los Angeles, CA, March 5, 2018
165. "New Approach to Thermoelectric Power Generation using Metal Alloys," (invited, given by Adams) Ford Motor Research, Dearborn, MI, November 15, 2017.
164. "Thermopower Enhancement in Bismuth Antimony Nanowire Composites," (poster by Vandaele), 36<sup>th</sup> International Conference on Thermoelectrics, Pasadena, CA, August 2, 2017.
163. "Magnon Drag Thermopower of Binary Ferromagnetic Alloys Fe-Co and Ni-C," (given by Zheng) 36<sup>th</sup> International Conference on Thermoelectrics, Pasadena, CA, August 2, 2017.
162. "Integrated Combustion Chamber/Heat Exchanger/Thermoelectric Generator," (given by Adams) 36<sup>th</sup> International Conference on Thermoelectrics, Pasadena, CA, August 2, 2017.
161. "Realization of the Spin Seebeck Effect in Bulk Nanocomposites," (prepared by Boona, given by Heremans) 36<sup>th</sup> International Conference on Thermoelectrics, Pasadena, CA, August 2, 2017.
160. "Electronic Transport Properties and Band Structure of 2-D Material NaSn<sub>2</sub>As<sub>2</sub>," (given by He) APS March Meeting, New Orleans, LA, March 17, 2017.
159. "Thermomagnetic Transport in the Weyl Semimetal NbP," (given by Watzman) APS March Meeting, New Orleans, LA, March 15, 2017.
158. "Magnon-Phonon Drag Induced in a Paramagnet," (given by Prakash) APS March Meeting, New Orleans, LA, March 14, 2017.
157. "Thermopower and Anomalous Nernst Coefficients of Binary Ferromagnetic Alloys Fe-Co and Ni-Cr," (given by Zheng) APS March Meeting, New Orleans, LA, March 13, 2017.
156. "Seebeck Effect in Bulk Composite Materials," (given by Boona) APS March Meeting, New Orleans, Louisiana, March 13, 2017.
155. "Magnon-drag Thermopower of Fe, Co, Ni, Fe<sub>1-x</sub>Co<sub>x</sub>, Ni<sub>1-x</sub>Cr<sub>x</sub>, Fe<sub>0.85</sub>Ga<sub>0.15</sub>," (poster by Zheng) MURI Review, Columbus, OH, January 31, 2017.
154. "Magnon-drag as a Pathway to High-efficiency Thermoelectric Metals," (invited, given by Watzman) University of Cincinnati Mechanical Engineering Graduate Seminar, Cincinnati, OH, January 20, 2017.
153. "Enhanced Thermoelectric Figure of Merit in Semiconductor Composites," (given by Adams) MRS Fall Meeting, Boston, MA, November 30, 2016.
152. "Thermopower and Nernst Coefficients of Binary Alloys Fe<sub>1-x</sub>M (M = Co, Ga)," (poster by Zheng) MRS Fall Meeting, Boston, MA November 29, 2016.
151. "Magnon-drag as a Pathway to High-efficiency Thermoelectric Metals," (poster by Watzman) International Thermoelectrics Summer School, Golden, CO, July 2016.
150. "Magnon-drag as a Pathway to High-efficiency Thermoelectric Metals," (poster by Watzman) Institute for Materials Research Materials Week, Columbus, OH, May 2016.
149. "Magnon-drag as a Pathway to High-efficiency Thermoelectric Metals," (given by Watzman) APS March Meeting, Baltimore, MD, March 18, 2016.
148. "Optimizing Thermoelectric Properties in Composites," (given by Adams) APS March Meeting, Baltimore, MD, March 18, 2016.
147. "Magnon-drag in Ca-doped YIG and Cobalt," (given by Zheng) APS March Meeting, Baltimore, MD, March 18, 2016.

146. “Thermomagnetic and Magnetocaloric Properties of Heusler Compound  $\text{Ni}_{45}\text{Co}_5\text{Mn}_{37}\text{In}_{13}$  and Thermomagnetic Properties of the Topological Weyl Semimetal NbP,” (given by Watzman) MRS Fall Meeting, Boston, MA, December 3, 2015.
145. “Overcoming the Effective Medium Limitations on Thermoelectric Composites,” (given by Adams) MRS Fall Meeting, Boston, MA, December 3, 2015.
144. “Magnon-drag Thermopower and Thermomagnetic Properties of Single-crystal Iron,” (poster by Watzman) Spin Thermal Workshop, Columbus, OH, September 16, 2015.
143. “Overcoming the Effective Medium Limitations on Thermoelectric Composites,” (given by Adams) International Thermoelectrics Conference, Dresden, Germany, June 29, 2015.
142. “Magnon-drag Thermopower and Thermomagnetic Properties of Single-crystal Iron,” (poster by Watzman) Institute for Materials Research Materials Week, Columbus, OH, May 14, 2015.
141. “Overcoming Effective Medium Limitations on Thermoelectric Composites,” (poster by Adams) AFOSR MURI Program Review, Columbus, OH, May 4, 2015.
140. “Magnon-drag Thermopower and Thermomagnetic Properties of Single-crystal Iron,” (given by Watzman) APS March Meeting, San Antonio, TX, March 3, 2015.
139. “Enhancement of Thermoelectric Performance in Composite Materials through Locally-modulated Doping,” (given by Adams) APS March Meeting, San Antonio, TX, March 3, 2015.
138. “Thermophysical and Thermomagnetic Properties of Heusler compound  $\text{Ni}_{45}\text{Co}_5\text{Mn}_{37}\text{In}_{13}$ ,” American Physical Society, March Meeting, San Antonio, TX, March 2, 2015.
137. “Overcoming the Effective Medium Limitations on Thermoelectric Composites,” Materials Research Society, Fall Meeting, Boston, MA, December 4, 2014.
136. “Doping  $\text{LiSbSe}_{2-x}\text{S}_x$  p-type with Sn Substitution for Sb,” (poster by Adams) MRS Fall Meeting, Boston, MA, December 3, 2014.
135. “Thermomagnetic Properties of Single-crystal Holmium and Single-crystal Iron,” (poster by Watzman), MRS Fall Meeting, Boston, MA, December 3, 2014.
134. “Improving Electronic Properties of Al Doped (p-type)  $\text{CoSb}_3$ ,” (given by Adams) International Conference on Thermoelectrics, Nashville, TN, July 7, 2014.
133. “Thermomagnetic Properties of Single-crystal Holmium and Single-crystal Iron,” (poster by Watzman), International Conference on Thermoelectrics, Nashville, TN, July 7, 2014.
132. “Thermomagnetic Properties of Single-crystal Holmium and Single-crystal Iron,” (poster by Watzman), Institute for Materials Research Materials Week, Columbus, OH, May 2014.
131. “Phonon and Magnon Heat Transport and Drag Effects,” APS March Meeting, Denver, CO, March 6, 2014.
130. “On the Thermal Hall Effect in the Electrically Insulating Ferrimagnet Yttrium Iron Garnet,” S. R. Boona and J. P. Heremans, Q25.0009, APS March Meeting, Denver, CO, March 3-7, 2014.
129. “Thermomagnetic Properties of Single-crystal Holmium,” S. J. Watzman, Y. B. Gao, H. Jin, S. R. Boona, and J. P. Heremans (given by Watzman), Q25.00005, APS March Meeting, Denver, CO, March 6, 2014.
128. “Experimental Determination of the Valence Band of  $\text{Bi}_2\text{Se}_3$ ,” Y. B. Gao, B. He, I. Androulakis, and J. P. Heremans (given by Gao), F34.00002, APS March Meeting, Denver, CO, March 3-7, 2014.
127. “Doping  $\text{CoSb}_3$  p-type with Al Substitution for Sb,” M. J. Adams, M. D. Nielsen, and J. P. Heremans (given by Adams), S25.00007, APS March Meeting, Denver, CO, March 6, 2014.
126. “Intermediate Valence Tuning and Seebeck Coefficient Optimization in Yb-based Low-Temperature Thermoelectric Materials,” G. Lehr, D. Morelli, H. Jin, and J. P. Heremans, Q25.00003, APS March Meeting, Denver, CO, March 3-7, 2014.
125. “Negative Magnetoresistance and S-F Scattering in  $\text{Pb}_{1-x}\text{Eu}_x\text{Se}$ ,” S. Kim, Y. B. Gao, B. He, G. Lehr, Y. Lee, M. Kanatzidis, D. Morelli, and J. P. Heremans, Q25.00002, APS March Meeting, Denver, CO, March 3-7, 2014.
124. “Galvanomagnetic and Thermoelectric Properties of  $\text{Bi}_2\text{Se}_{3-x}\text{S}_x$  Prepared by Spark Plasma Sintering and Annealing,” He, B., Gao, Y. B., and Heremans, J. P., Q25.00013, March Meeting of the American Physical Society, Denver, Colorado, USA, March 3-7, 2014.
123. “Reducing the Lattice Thermal Conductivity of the Rocksalt I-V-VI<sub>2</sub> Compounds,” M. D. Nielsen, S. Kim, M. Wuttig, F. Lange, and J. P. Heremans, M25.00004, APS March Meeting, Denver, CO, March 3-7, 2014.
122. “Observation of a Magnetic Field Dependence of the Lattice Thermal Conductivity,” H. Jin, O. Restrepo, N. Antolin, W. Windl, S. Barnes, and J. P. Heremans, Q25.00007, APS March Meeting, Denver, CO, March 3-7, 2014.

121. Lehr, G., Jin, H., Morelli, D., and Heremans, J. P., BB12.02, "Controlling the Thermoelectric Properties of Intermediate Valence Compounds at Low Temperature Using Chemical Pressure: the  $\text{Yb}_{1-x}\text{Sc}_x\text{Al}_2$  Solid Solution," Material Research Society Fall Meeting, Boston Massachusetts USA December 1-6, 2013.
120. Boona, S. R. and Heremans, J. P., "Thermal Hall Effect and Magnon Thermal Mean Free Path in Yttrium Iron Garnet," Physics Department at The Ohio State University Condensed Matter Experiment Seminar, Columbus, Ohio, USA November 14, 2013.
119. Jin, H., "Thermomagnetic Effects in Amorphous Ferromagnetic Alloys and the Transverse Spin-Seebeck Configuration," Gordon Research Conference, Spin Dynamics in Nanostructures, Hong Kong, China, August 18-21, 2013.
118. Jin, H., Jaworski, C. M., Yang, Z., Meyers, R. C., and Heremans, J. P., "Measurement of Phonon Drag Thermopower by InSb Phonon Thermocouple," 32<sup>nd</sup> International Conference on Thermoelectrics, Kobe, Japan, June 30-July 4, 2013.
117. Nielsen, M.D., Kim, S., Ozolins, V., and Heremans, J.P., "Thermoelectric Properties and the Role of Anharmonicity in I-V-VI<sub>2</sub> Compounds," DOE Energy Frontier Research Center Principal Investigators' Meeting, Washington DC, USA, July 18-19, 2013.
116. Jin, H. and Heremans, J. P., I5.06 "Improving Thermoelectric Performance of Polycrystalline n-type Bi<sub>1-x</sub>Sb<sub>x</sub> Alloys," Materials Research Society Spring Meeting and Exhibit, San Francisco, CA USA, April 1-5, 2013.
115. Jin, H., Heremans, J. P., and Jaworski, C. M., I6.01, "The Phonon Thermocouple," Materials Research Society Spring Meeting and Exhibit, San Francisco, CA USA, April 1-5, 2013.
114. Gao, Y. B., Parker, D., and Heremans, J. P., T12.00012, "Valence Band Structure of Bi<sub>2</sub>Se<sub>3</sub>," American Physical Society Meeting, Baltimore, Maryland USA, March 18-22, 2013.
113. Wickey, K., Kent, T., Myers, R. C., Heremans, J. P., and Johnston-Halperin, E., U20.00002, "Towards FIB Patterning of Commercial SiN Membranes for Sensitive Magneto-calorimetry," American Physical Society Meeting, Baltimore, Maryland. USA, March 18-22, 2013.
112. Heremans, J. P., Jin, H., Jaworski, C. M., and Barnes, S., U18.00007, "Phonon Drag in InSb: Experiment," American Physical Society Meeting, Baltimore, Maryland USA, March 18-22, 2013.
111. Barnes, S. and Heremans, J. P., U18.00008, "Phonon Drag in InSb: Theory and 'Spin'-motive Force," American Physical Society Meeting, Baltimore, Maryland USA, March 18-22, 2013.
110. Jin, H., Yang, Z., Myers, R. C., and Heremans, J. P., Y14.00002, "Spin-Seebeck Effect in Amorphous Ferromagnetic Alloys," American Physical Society Meeting, Baltimore, Maryland USA, March 18-22, 2013.
109. Chamoire, A. M. and Heremans, J. P., Z12.10, "Thermomagnetic Effects in Elemental Rare-earth Single Crystals," American Physical Society Meeting, Baltimore, Maryland. USA March 18-22, 2013.
108. Nielsen, M. D., Ozolins, V., and Heremans, J. P., N12.00009, "Doping Studies of Alkali-metal Rocksalt Based I-V-VI<sub>2</sub> Compounds with Intrinsically Minimal Thermal Conductivity," American Physical Society Meeting, Baltimore, Maryland. USA March 18-22, 2013.
107. Kim, S., Wiendlocha, B., and Heremans, J. P., N12.00007, "P-type Electronic and Thermal Transport Properties of Mg<sub>2</sub>Sn<sub>1-x</sub>Si<sub>x</sub>," American Physical Society Meeting, Baltimore, Maryland. USA March 18-22, 2013.
106. Chamoire, A. M. and Heremans, J. P., "Thermomagnetic Effects in Elemental Rare-earth Single Crystals," 245 American Chemical Society National Meeting & Exposition, New Orleans, LA USA, April 7-11, 2013.
105. Kim, S., Evola, E. E., Nielsen, M. D., and Heremans, J. P., B4.10, "Search for Resonant Levels in Mg<sub>2</sub>Sn," Materials Research Society Fall meeting and Exhibit, Boston, Massachusetts USA, November 25-30, 2012.
104. Nielsen, M. D., Ozolins, V., and Heremans, J. P., "Doping Studies of I-V-VI<sub>2</sub> Compounds with Intrinsically Minimal Thermal Conductivity," 31<sup>st</sup> International Conference on Thermoelectricity, Aalborg, Denmark, July 9-12, 2012.
103. Jaworski, C. M., et al., A2\_16, "Valence Band Structure of Highly Efficient p-type Thermoelectric PbTe/PbS Alloys," 31<sup>st</sup> International Conference on Thermoelectricity, Aalborg, Denmark, July 9-12, 2012.
102. Boona, S. R., et al., A1\_2, "Enhanced Thermoelectric Properties of CePd<sub>3</sub> Through Thermal Conductivity Reduction," 31<sup>st</sup> International Conference on Thermoelectricity, Aalborg, Denmark, July 9-12, 2012.
101. Jin, H., Wiendlocha, B., and Heremans, J. P., A1\_8, "Thermoelectric Properties of Alkali-doped Bismuth-Antimony Alloys and Discovery of Potassium as a Resonant Impurity," 31<sup>st</sup> International Conference on Thermoelectricity, Aalborg, Denmark, July 9-12, 2012.
100. Heremans, J. P., et al., A1\_6, "Giant Spin-Seebeck effect in InSb," 31<sup>st</sup> International Conference on Thermoelectricity, Aalborg, Denmark, July 9-12, 2012.

99. Nielsen, M. D., Ozolins, V., and Heremans, J. P., "Lone Pair Electrons Reduce Thermal Conductivity of I-V-VI<sub>2</sub> Compounds," DOE Thermoelectric Applications Workshop, Baltimore, MD USA, March 19-22, 2012.
98. Nielsen, M. D., Ozolins, V., and Heremans, J. P., JJ7.3, "Thermal Conductivity and Soft Phonon Modes in I-V-VI<sub>2</sub> Compounds," Material Research Society Spring Meeting, San Francisco, CA USA, April 9-13, 2012.
97. Jin, H., Wiendlocha, B., and Heremans, J. P., JJ1.5, "Potassium is a Resonant Level in BiSb Alloys," Material Research Society Spring Meeting, San Francisco, CA USA, April 9-13, 2012.
96. Chamoire, A. M. and Heremans, J. P., JJ1.6, "Nernst-Ettingshausen Effect in Elemental Rare-earth." Material Research Society Spring Meeting, San Francisco, CA USA, April 9-13, 2012.
95. Jaworski, C. M., Myers, R. C., and Heremans, J. P., LL9.3, "Spin-Seebeck Power Generation," Material Research Society Spring Meeting, San Francisco, CA USA, April 9-13, 2012.
94. Nielsen, M. D., Hui, S., Uher, C., Tobola, J., and Heremans, J. P., L17.00010, "Thermoelectric Properties of CoSb<sub>3-x</sub>Sn<sub>x</sub>," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27-March 2, 2012.
93. Evola, E., Nielsen, M. D., Jaworski, C. M., and Heremans, J. P., L17.00004, "Thermoelectric Properties of Indium Doped PbSe," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27- March 2, 2012.
92. Gao, Y. B., Koenig, J., Nielsen, M. D., Boettner, H., and Heremans, J. P., L17.00002, "Fermi Level Pinning in Ti Doped PbTe," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27-March 2, 2012.
91. Heremans, J. P., Jin, H., Wiendlocha, B., L17.00001, "Potassium is a Resonant Level in Bi<sub>1-x</sub>Sb<sub>x</sub> Alloys," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27-March 2, 2012.
90. Chamoire, A. M. and Heremans, J. P., H17.00010, "Nernst-Ettingshausen Effect in Elemental Rare-Earth Single Crystals," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27- March 2, 2012.
89. Orovets, C., Jin, H., Wiendlocha, B., and Heremans, J. P., H17.00012, "Cryogenic Thermoelectric Properties of the Bismuth-Magnesium and Bismuth-Antimony-Magnesium Systems," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27- March 2, 2012.
88. Jaworski, C. M., Myers, R. C., and Heremans, J. P., L14.00005, "Spin-Seebeck Effect in III-V Based Semiconductors," American Physical Society Meeting, Boston, Massachusetts USA, Feb. 27- March 2, 2012.
87. Nielsen, M. D., Barabash, S. V., Ozolins, V., and Heremans, J. P., T11.1 "Thermal Conductivity of NaSbTe<sub>2</sub>, AgSbTe<sub>2</sub> and their Alloys: Experimental Results," The 30th International Conference on Thermoelectrics, Traverse City, Michigan USA, July 17-21, 2011.
86. Chen, Y., Gao, Y. B., Nielsen, M. D., Zhu, T. J., Zhao, X. B., and Heremans, J. P., T11.2 "Transport Properties of (Ag<sub>1-y</sub>SbTe<sub>2+z</sub>)<sub>1-x</sub>(SnTe)<sub>x</sub> Solid Solutions," The 30th International Conference on Thermoelectrics, Traverse City, Michigan USA, July 17-21, 2011.
85. Barabash, S., Nielsen, M. D., Heremans, J. P., and Ozolins, V., H4.2 "Phonon Softening and Low Thermal Conductivity in Cubic I-V-VI Semicoductors; The 30th International Conference on Thermoelectrics, Traverse City, Michigan, July 17-21, 2011.
84. Eric Evola, Michele Nielsen, and Joseph Heremans, P146. Thermoelectric properties of PbSe doped with Indium, The 30th International Conference on Thermoelectrics, Traverse City, Michigan, July 17-21, 2011.
83. Sergey V. Barabash, Vidvuds Ozolins, Michele D. Nielsen, and Joseph P. Heremans, Large Grüneisen parameter and strong off-stoichiometry in AgSbTe<sub>2</sub>: a first principle study, American Physical Society March Meeting, Dallas, TX, March 21-25, 2011.
82. Hyungyu Jin, Bartłomiej Wiendlocha, Katherine Whitehouse, Eric Evola, and Joseph P. Heremans, Indium is an acceptor in bismuth, American Physical Society March Meeting, Dallas, TX, March 21-25, 2011.
81. Audrey Chamoire, Christopher Jaworski, Joseph Heremans, Chi-Yueh Kao, and Arthur Epstein, Giant Seebeck coefficient in organic-based magnetic semiconductor V(TCNE)<sub>x</sub>, American Physical Society March Meeting, Dallas, TX, March 1-25, 2011.
80. Christopher M. Jaworski, Jing Yang, Shawn Mack, David. D. Awschalom, Joseph P. Heremans, and Roberto C. Myers, The spin-Seebeck effect in a GaMnAs/MnAs bilayer, American Physical Society March Meeting, Dallas, TX, March 21-25, 2011.
79. Christopher M. Jaworski, Ellen Heian, Sharp Hoang, and Joseph P. Heremans, The tin impurity in BiSb<sub>2</sub>Te<sub>3</sub> alloys, US Department of Energy Workshop on Applications of Thermoelectricity, San Diego, January 3-6, 2011.
78. Joseph P. Heremans, Lon Bell, Mercuri Kanatzidis, Dmitri Kossakovski, and Guo-Quan Lu, Project Seebeck, US Department of Energy Workshop on Applications of Thermoelectricity, San Diego, January 3-6, 2011.

77. Joseph P. Heremans, Christopher M. Jaworski, Adriana Paracchino, Michael Grätzel, The Photo-Seebeck effect: a new way to investigate the photoresponse, MM10.7, Materials Research Society Fall Meeting, Boston, MA, Dec 2, 2010.
74. Christopher M. Jaworski, Jing Yang, Shawn Mack, David. D. Awschalom, Joseph P. Heremans, and Roberto C. Myers, Observation of the spin-Seebeck effect in a ferromagnetic semiconductor, Materials Research Society Fall Meeting, Boston, MA, Dec 2, 2010.
76. Christopher M. Jaworski and Joseph P. Heremans, Investigation into Mechanisms for Increasing the zT of [Bi,Sb]Te Alloys, DD4.9, Materials Research Society Spring Meeting, San Francisco, CA, April 5-9, 2010.
75. Michele D. Nielsen and Joseph P. Heremans, Experimental Investigation into Single Phase [Ag,Sb]Te<sub>2</sub> Thermoelectric Material, DD6.6, Materials Research Society Spring Meeting, San Francisco, CA, April 5-9, 2010.
74. Hyungyu Jin, C.M. Jaworski and J. P. Heremans, P-type Bi<sub>1-x</sub>Sb<sub>x</sub> above 300K, Bull. Am. Phys. Soc. **55** J29.5, (2010).
73. E.M. Levin, K. Schmidt-Rohr, C.M. Jaworski, J.P. Heremans, Sb-doped PbTe: An NMR Perspective, Bull. Am. Phys. Soc. **55** P29.5, (2010).
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71. Christopher M. Jaworski, V. Kulbachinskii, and J. P. Heremans, Is Tin a Resonant Level in Bismuth Telluride?, North American Solid State Chemistry Conference, Ohio State University, June 18, 2009.
70. Christopher M Jaworski, Vladimir Kulbachinskii, and Joseph P Heremans, Is Tin a Resonant Level in Bismuth Telluride? N6.8, Materials Research Society 2009 Spring Meeting, San Francisco CA, April 13-17, 2009.
69. Joseph Sootsman, Vladimir Jovovic, Christopher M Jaworski, Joseph P Heremans, Jiaqing He, Vinayak P Dravid, and Mercuri G Kanatzidis, Understanding Electrical Transport and the Large Power Factor Enhancements in Co-Nanostructured PbTe, N4.1, Materials Research Society 2009 Spring Meeting, San Francisco CA, April 13-17, 2009.
68. V. Jovovic and J.P. Heremans, Seebeck coefficient enhancement due to band structure distortions in Landau levels, 28th International / 7th European Conference on Thermoelectrics, Freiburg, Germany, July 27-30, 2009.
67. C.M. Jaworski, H.Y. Chen, N. Savvides, B. Wiendlocha, J. Tobola, and J.P. Heremans, Experimental and theoretical investigation of the hole Fermi surface of Mg<sub>2</sub>Sn, 28th International / 7th European Conference on Thermoelectrics, Freiburg, Germany, July 27-30, 2009.
66. Michele Nielsen, Vladimir Jovovic, Christopher Jaworski, Joseph Heremans, Galvanomagnetic and Thermomagnetic Properties of Ag<sub>1-x</sub>Na<sub>x</sub>SbTe<sub>2</sub> Alloys, Bull. Am. Phys. Soc. **54**, L28.00006 (2009).
65. Vladimir Jovovic and Joseph Heremans, Galvanomagnetic and thermomagnetic properties of thallium doped PbSnTe and PbSeTe, Bull. Am. Phys. Soc. **54**, L28.00010 (2009).
64. Christopher Jaworski, Janusz Tobola, and Joseph Heremans, Antimony: a Dual Donor in Lead Telluride, Bull. Am. Phys. Soc. **54**, L28.00011 (2009).
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