

RESUME

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CURRENT POSITION

Argonne Distinguished Fellow

RESEARCH AREA

Condensed Matter Theory

EDUCATION

Ph.D. Physics, Tulane University, 1983
B.S. Physics, Louisiana State University-Shreveport, 1979 (Summa Cum Laude)

HONORS

LSU-S Circle of Excellence Award (2008)
American Physical Society Outstanding Referee (2008)
University of Chicago Distinguished Performance Award (1999)
Fellow of the American Physical Society (1995)

PROFESSIONAL EXPERIENCES

2008-present: Argonne Distinguished Fellow
2018: Interim Director, Physical Sciences & Engineering, Argonne National Laboratory
2015-2018: Fellow, Institute for Molecular Engineering, University of Chicago

2011-2018: Director, Materials Science Division, Argonne National Laboratory
2009-2018: Principal Investigator, Center for Emergent Superconductivity
2000-2011: Head, Condensed Matter Theory Group, Argonne National Laboratory
2007-2010: Adjunct Professor, Dept. of Physics and Astronomy, Northwestern University
1998-2008: Senior Physicist, Argonne National Laboratory
2003: Invited Professorship, ESPCI, Paris, France
2001: Visiting Scientist, SPhT, Saclay, France
2000, 2005: Visitor, Institute for Theoretical Physics, Santa Barbara
1989-2000: Principal Investigator, NSF S&T Center for Superconductivity
1990-1998: Physicist, Argonne National Laboratory
1994, 1998, 2001, 2004, 2007: Visitor, Aspen Center for Physics
1992: Visiting Scientist, Department of Physics, Cambridge University, UK
1986-1990: Assistant Physicist, Argonne National Laboratory
1983-1986: Director's Postdoctoral Appointee, Argonne National Laboratory
1983-1985: Research Associate, Department of Physics, Northwestern University
1983: Research Assistant, Department of Physics, Tulane University
1982, 1983: Thesis Parts Appointment, Argonne Natl. Laboratory
1981: Visitor, Institute for Advanced Study, Princeton

EDITORIAL BOARD

Physical Review X, 2015-present

Physical Review B, Committee of Visitors, 2015

Physical Review B, 2000-2005

PUBLICATIONS

244. A. S. Botana and M. R. Norman, “Layered palladates and their relation to nickelates and cuprates”, *Phys. Rev. Matls.* 2, 104803 (2018).
243. A. S. Botana, H. Zheng, S. H. Lapidus, J. F. Mitchell, M. R. Norman, “Averievite: a copper oxide kagome antiferromagnet”, *Phys. Rev. B* 98, 054421 (2018).
242. M. R. Norman, “Aleksii A. Abrikosov, a Biographical Memoir”, *Natl. Acad. Sci.* (2018).
241. M. R. Norman and J. C. Seamus Davis, “Quantum oscillations in a biaxial pair density wave state”, *Proc. Natl. Acad. Sci.* 115, 5389-5391 (2018).
240. M. R. Norman, “Copper tellurium oxides – A playground for magnetism”, *J. Magn. Magn. Mater.* 452, 507-511 (2018).
239. Sean Vig, Anshul Kogar, Matteo Mitrano, Ali A. Husain, Vivek Mishra, Melinda S. Rak, Luc Venema, Peter D. Johnson, Genda D. Gu, Eduardo Fradkin, Michael R. Norman, Peter Abbamonte, “Measurement of the dynamic charge response of materials using low-energy, momentum-resolved electron energy-loss spectroscopy (M-EELS)”, *SciPost Phys.* 3, 026 (2017).
238. Michael R. Norman and Andrey A. Varlamov, “Alexei Alexeyevich Abrikosov”, *Physics Today* 70, No. 10, p. 73 (2017).
237. S. Di Matteo and M. R. Norman, “Nature of the tensor order in $\text{Cd}_2\text{Re}_2\text{O}_7$ ”, *Phys. Rev. B* 96, 115156 (2017).
236. F. Han, J. Xu, A. S. Botana, Z. L. Xiao, Y. L. Wang, W. G. Yang, D. Y. Chung, M. G. Kanatzidis, M. R. Norman, G. W. Crabtree and W. K. Kwok, “Separation of electron and hole dynamics in the semimetal LaSb”, *Phys. Rev. B* 96, 125112 (2017).
235. A. S. Botana, V. Pardo and M. R. Norman, “Electron doped layered nickelates: Spanning the phase diagram of the cuprates”, *Phys. Rev. Matls.* 1, 021801(R) (2017).
234. J. Zhang, A. S. Botana, J. W. Freeland, D. Phelan, H. Zheng, V. Pardo, M. R. Norman and J. F. Mitchell, “Large orbital polarization in a metallic square-planar nickelate”, *Nature Physics* 13, 864-869 (2017).
233. T. Micklitz and M. R. Norman, “Symmetry-enforced line nodes in unconventional superconductors”, *Phys. Rev. Lett.* 118, 207001 (2017).
232. A. S. Botana and M. R. Norman, “Electronic structure of CuTeO_4 and its relationship to cuprates”, *Phys. Rev. B* 95, 115123 (2017).
231. T. Micklitz and M. R. Norman, “Nodal lines and nodal loops in nonsymmorphic odd-parity superconductors”, *Phys. Rev. B* 95, 024508 (2017).

230. M. R. Norman, “Herbertsmithite and the Search for the Quantum Spin Liquid”, *Rev. Mod. Phys.* **88**, 041002 (2016).
229. A. Kaminski, S. Rosenkranz, M. R. Norman, M. Randeria, Z. Z. Li, H. Raffy, and J. C. Campuzano, “Destroying Coherence in High-Temperature Superconductors with Current Flow”, *Phys. Rev. X* **6**, 031040 (2016).
228. S. Di Matteo and M. R. Norman, “Magnetic ground state of Sr_2IrO_4 and implications for second-harmonic generation”, *Phys. Rev. B* **94**, 075148 (2016).
227. T.-H. Han, M. R. Norman, J.-J. Wen, J. A. Rodriguez-Rivera, J. S. Helton, C. Broholm, and Y. S. Lee, “Correlated impurities and intrinsic spin-liquid physics in the kagome material herbertsmithite”, *Phys. Rev. B* **94**, 060409(R) (2016).
226. A. S. Botana, V. Pardo, W. E. Pickett, and M. R. Norman, “Charge ordering in $\text{Ni}^{1+}/\text{Ni}^{2+}$ nickelates: $\text{La}_4\text{Ni}_3\text{O}_8$ and $\text{La}_3\text{Ni}_2\text{O}_6$ ”, *Phys. Rev. B* **94**, 081105(R) (2016).
225. J. Zhang, Y.-S. Chen, D. Phelan, H. Zheng, M. R. Norman, and J. F. Mitchell, “Stacked charge stripes in the quasi-2D trilayer nickelate $\text{La}_4\text{Ni}_3\text{O}_8$ ”, *Proc. Natl. Acad. Sci.* **113**, 8945-8950 (2016).
224. C. Phatak, S. Zhang, W. Jiang, S. G. E. te Velthuis, A. Hoffmann, J. F. Mitchell, H. Zheng, M. R. Norman, and A. Petford-Long, “Domain behavior in functional materials studied using Lorentz microscopy”, *Microscopy and Microanalysis* **22 (S3)**, 1680 (2016).
223. M. R. Norman, “Materials design for new superconductors”, *Rep. Prog. Phys.* **79**, 074502 (2016).
222. M. R. Norman, “Vector optical activity in the Weyl semimetal TaAs”, *Phys. Rev. B* **92**, 241116(R) (2015).
221. C. Phatak, A. K. Petford-Long, H. Zheng, J. F. Mitchell, S. Rosenkranz and M. R. Norman, “Ferromagnetic domain behavior and phase transition in bilayer manganites investigated at the nanoscale”, *Phys. Rev. B* **92**, 224418 (2015).
220. V. Mishra and M. R. Norman, “Strong coupling critique of spin fluctuation driven charge order in underdoped cuprates”, *Phys. Rev. B* **92**, 060507(R) (2015).
219. M. R. Norman, “Dichroism as a probe for parity-breaking phases of spin-orbit coupled metals”, *Phys. Rev. B* **92**, 075113 (2015).
218. M. R. Norman, “Linear dichroism and the nature of charge order in underdoped cuprates”, *Phys. Rev. B* **91**, 140505(R) (2015).
217. M. R. Norman, “Superconductivity with a Twist”, *Physics* **8**, 24 (2015).

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215. B. Keimer, S. A. Kivelson, M. R. Norman, S. Uchida, J. Zaanen, “From Quantum Matter to High Temperature Superconductivity in Copper Oxides”, *Nature* 518, 179-186 (2015).
214. M. R. Norman, “Unconventional Superconductivity”, in *Novel Superfluids*, Vol. 2, ed. K. H. Bennemann and J. B. Ketterson (Oxford Univ. Pr., Oxford, 2014), p. 23-79.
213. V. Mishra, U. Chatterjee, J. C. Campuzano and M. R. Norman, “Effect of the pseudogap on the transition temperature in the cuprates and implications for its origin”, *Nature Phys.* 10, 357-360 (2014).
212. M. R. Norman and C. Proust, “Focus on fermiology of the cuprates”, *New J. Phys.* 16, 045004 (2014).
211. A. Melikyan and M. R. Norman, “Symmetry of the charge density wave in cuprates”, *Phys. Rev. B* 89, 024507 (2014).
210. M. R. Norman, “Plane speaking”, *Nature Phys.* 9, 757-758 (2013).
209. J. Zhao, U. Chatterjee, D. Ai, D. G. Hinks, H. Zheng, G. D. Gu, J.-P. Castellan, S. Rosenkranz, H. Claus, M. R. Norman, M. Randeria and J. C. Campuzano, “Universal features in the photoemission spectroscopy of high-temperature superconductors”, *Proc. Natl. Acad. Sci.* 110, 17774-17777 (2013).
208. M. R. Norman, “X-ray natural dichroism and chiral order in underdoped cuprates”, *Phys. Rev. B* 87, 180506(R) (2013).
207. I. Paul, C. Pepin, and M. R. Norman, “Equivalence of Single-Particle and Transport Lifetimes from Hybridization Fluctuations”, *Phys. Rev. Lett.* 110, 066402 (2013).
206. A. Soumyanarayanan, M. M. Yee, Y. He, J. van Wezel, D. J. Rahn, K. Rossnagel, E. W. Hudson, M. R. Norman, and J. E. Hoffman, “Quantum phase transition from triangular to stripe charge order in NbSe_2 ”, *Proc. Natl. Acad. Sci.* 110, 1623-1627 (2013).
205. T. Micklitz, A. Levchenko, and M. R. Norman, “Incoherent pair tunneling in the pseudogap phase of the cuprates”, *Phys. Rev. B* 87, 024503 (2013).
204. S. Di Matteo and M. R. Norman, “Orbital currents, anapoles, and magnetic quadrupoles in CuO ”, *Phys. Rev. B* 85, 235143 (2012).
203. M. R. Norman, “Cuprates – An Overview”, *J. Supercond. Nov. Magn.* 25, 2131 (2012).

202. J.-P. Castellán, S. Rosenkranz, E. A. Goremychkin, D.Y. Chung, I. S. Todorov, M. G. Kanatzidis, I. Eremin, J. Knolle, A.V. Chubukov, S. Maiti, M. R. Norman, F. Weber, H. Claus, T. Guidi, R. I. Bewley and R. Osborn, “Effect of Fermi Surface Nesting on Resonant Spin Excitations in $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ ”, *Phys. Rev. Lett.* 107, 177003 (2011).
201. L. W. Harriger, H. Q. Luo, M. S. Liu, C. Frost, J. P. Hu, M. R. Norman and P. Dai, “Nematic spin fluid in the tetragonal phase of BaFe_2As_2 ”, *Phys. Rev. B* 84, 054544 (2011).
200. U. Chatterjee, D. Ai, J. Zhao, S. Rosenkranz, A. Kaminski, H. Raffy, Z. Z. Li, K. Kadowaki, M. Randeria, M. R. Norman and J. C. Campuzano, “Electronic phase diagram of high-temperature copper oxide superconductors”, *Proc. Natl. Acad. Sci.* 108, 9346-9349 (2011).
199. Y. Sassa, M. Radovic, M. Mansson, E. Razzoli, X. Y. Cui, S. Pailhes, S. Guerrero, M. Shi, P. R. Willmott, F. Mileto Granozio, J. Mesot, M. R. Norman, and L. Patthey, “Ortho-II band folding in $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ films revealed by angle-resolved photoemission”, *Phys. Rev. B* 83, 140511(R) (2011).
198. M. R. Norman, “The Challenge of Unconventional Superconductivity”, *Science* 332, 196-200 (2011).
197. A. Levchenko and M. R. Norman, “Proposed Giaever transformer to probe the pseudogap phase of the cuprates”, *Phys. Rev. B* 83, 100506(R) (2011).
196. C. Pepin, M. R. Norman, S. Burdin and A. Ferraz, “Modulated Spin Liquid: A New Paradigm for URu_2Si_2 ”, *Phys. Rev. Lett.* 106, 106601 (2011).
195. S. R. Julian and M. R. Norman, “Genetics and g-factors”, *Nat. Phys.* 7, 191-192 (2011).
194. A. Levchenko, M. R. Norman and A. A. Varlamov, “Nernst effect from fluctuating pairs in the pseudogap phase of the cuprates”, *Phys. Rev. B* 83, 020506(R) (2011).
193. M. R. Norman, A. Kaminski, S. Rosenkranz and J. C. Campuzano, “Comment on ‘Circular Dichroism in the Angle-Resolved Photoemission Spectrum of the High-Temperature $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ Superconductor: Can These Measurements Be Interpreted as Evidence for Time-Reversal Symmetry Breaking?’”, *Phys. Rev. Lett.* 105, 189701 (2010).
192. M. R. Norman, “Fermi-surface reconstruction and the origin of high-temperature superconductivity”, *Physics* 3, 86 (2010).
191. O. J. Lipscombe, L. W. Harriger, P. G. Freeman, M. Enderle, C. Zhang, M. Wang, T. Egami, J. Hu, T. Xiang, M. R. Norman, and P. Dai, “Anisotropic Neutron Spin Resonance in Superconducting $\text{BaFe}_{1.9}\text{Ni}_{0.1}\text{As}_2$ ”, *Phys. Rev. B* 82, 064515 (2010).
190. M. R. Norman and J. Lin, “Spin zeros and the origin of Fermi-surface reconstruction in the cuprates”, *Phys. Rev. B* 82, 060509(R) (2010).

189. Z. Ristivojevic and M. R. Norman, "Proposal to detect vortices above the superconducting transition temperature", *Phys. Rev. B* 82, 060506(R) (2010).
188. A. Levchenko, T. Micklitz, M. R. Norman and I. Paul, "Transport implications of Fermi arcs in the pseudogap phase of the cuprates", *Phys. Rev. B* 82, 060502(R) (2010).
187. M. R. Norman, J. Lin and A. J. Millis, "Lifshitz transition in underdoped cuprates", *Phys. Rev. B* 81, 180513(R) (2010).
186. T. Micklitz and M. R. Norman, "Spin Hamiltonian of hyper-kagome $\text{Na}_4\text{Ir}_3\text{O}_8$ ", *Phys. Rev. B* 81, 174417 (2010).
185. M. R. Norman and T. Micklitz, "Electronic structure of hyper-kagome $\text{Na}_4\text{Ir}_3\text{O}_8$ ", *Phys. Rev. B* 81, 024428 (2010).
184. U. Chatterjee, M. Shi, D. Ai, J. Zhao, A. Kanigel, S. Rosenkranz, H. Raffy, Z. Z. Li, K. Kadowaki, D. G. Hinks, Z. J. Xu, J. S. Wen, G. Gu, C. T. Lin, H. Claus, M. R. Norman, M. Randeria and J. C. Campuzano, "Observation of a d-wave nodal liquid in highly underdoped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ", *Nature Physics* 6, 99 (2010).
183. T. Micklitz and M. R. Norman, "Nature of spectral gaps due to pair formation in superconductors", *Phys. Rev. B* 80, 220513(R) (2009).
182. M. Shi, A. Bendounan, E. Razzoli, S. Rosenkranz, M. R. Norman, J. C. Campuzano, J. Chang, M. Mansson, Y. Sassa, T. Claesson, O. Tjernberg, L. Patthey, N. Momono, M. Oda, M. Ido, S. Guerrero, C. Mudry and J. Mesot, "Spectroscopic evidence for preformed Cooper pairs in the pseudogap phase of cuprates", *Europhysics Letters* 88, 27008 (2009).
181. T. Micklitz and M. R. Norman, "Odd parity and line nodes in nonsymmorphic superconductors", *Phys. Rev. B* 80, 100506(R) (2009).
180. M. R. Norman, "Chasing arcs in cuprate superconductors", *Science* 325, 1080-1081 (2009).
179. M. R. Norman, "Cargo-cult science redux", *Nat. Phys.* 5, 451-452 (2009).
178. M. R. Norman and T. Micklitz, "How to measure a spinon Fermi surface", *Phys. Rev. Lett.* 102, 067204 (2009).
177. A. Abanov, A. V. Chubukov and M. R. Norman, "Gap anisotropy and universal pairing scale in a spin-fluctuation model of cuprate superconductors", *Phys. Rev. B* 78, 220507(R) (2008).
176. R. Saniz, M. R. Norman and A. J. Freeman, "Orbital Mixing and Nesting in the Bilayer Manganites $\text{La}_{2-2x}\text{Sr}_{1+2x}\text{Mn}_2\text{O}_7$ ", *Phys. Rev. Lett.* 101, 236402 (2008).

175. A. Kanigel, U. Chatterjee, M. Randeria, M. R. Norman, G. Koren, K. Kadowaki and J. C. Campuzano, "Evidence for Pairing above the Transition Temperature of Cuprate Superconductors from the Electronic Dispersion in the Pseudogap Phase", *Phys. Rev. Lett.* 101, 137002 (2008).
174. M. R. Norman, "High Temperature Superconductivity in the Iron Pnictides", *Physics* 1, 21 (2008).
173. M. Shi, J. Chang, S. Pailhes, M. R. Norman, J. C. Campuzano, M. Mansson, T. Claesson, O. Tjernberg, A. Bendounan, L. Patthey, N. Momono, M. Oda, M. Ido, C. Mudry and J. Mesot, "Coherent d -Wave Superconducting Gap in Underdoped $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ by Angle-Resolved Photoemission Spectroscopy", *Phys. Rev. Lett.* 101, 047002 (2008).
172. I. Paul, A. D. Klironomos and M. R. Norman, "Quasiparticle mirages in the tunneling spectra of d -wave superconductors", *Phys. Rev. B* 78, 020508(R) (2008).
171. I. Paul, C. Pepin and M. R. Norman, "Multiscale fluctuations near a Kondo breakdown quantum critical point", *Phys. Rev. B* 78, 035109 (2008).
170. A. V. Chubukov and M. R. Norman, "One-gap scenario to explain Raman scattering in a d -wave superconductor", *Phys. Rev. B* 77, 214529 (2008).
169. G. J. McMullan, P. M. C. Rourke, M. R. Norman, A. D. Huxley, N. Doiron-Leyraud, J. Flouquet, G. G. Lonzarich, A. McCollam and S. R. Julian, "The Fermi surface and f -valence electron count of UPt_3 ", *New J. Phys.* 10, 053029 (2008).
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167. M. R. Norman, A. V. Chubukov, E. van Heumen, A. B. Kuzmenko and D. van der Marel, "Optical integral in the cuprates and the question of sum rule violation", *Phys. Rev. B* 76, 220509(R) (2007).
166. A. J. Millis and M. R. Norman, "Antiphase stripe order as the origin of electron pockets observed in $1/8$ -hole-doped cuprates", *Phys. Rev. B* 76, 220503(R) (2007).
165. M. R. Norman, "A celebration of pairs", *Nature Phys.* 3, 837-838 (2007).
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163. M. R. Norman, A. Kanigel, M. Randeria, U. Chatterjee and J. C. Campuzano, "Modeling the Fermi arc in underdoped cuprates", *Phys. Rev. B* 76, 174501 (2007).
162. A. Kanigel, U. Chatterjee, M. Randeria, M. R. Norman, S. Souma, M. Shi, Z. Z. Li, H. Raffy and J. C. Campuzano, "Protected nodes and the collapse of the Fermi arcs in high T_c

cuprates”, Phys. Rev. Lett. 99, 157001 (2007).

161. M. R. Norman, “High temperature superconductivity – magnetic mechanisms” in *Handbook of Magnetism and Advanced Magnetic Materials*, Vol. 5, ed. H. Kronmuller and S. Parkin (John Wiley, New York, 2007), p. 2671-2688.

160. S. di Matteo and M. R. Norman, “X-ray dichroism and the pseudogap phase of the cuprates”, Phys. Rev. B 76, 014510 (2007).

159. U. Chatterjee, M. Shi, A. Kaminski, A. Kanigel, H. M. Fretwell, K. Terashima, T. Takahashi, S. Rosenkranz, Z. Z. Li, H. Raffy, A. Santander-Syro, K. Kadowaki, M. Randeria, M. R. Norman and J. C. Campuzano, “Anomalous dispersion in the autocorrelation of angle-resolved photoemission spectra of high-temperature $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ superconductors”, Phys. Rev. B 75, 012504 (2007).

158. S. R. Julian and M. R. Norman, “Local pairs and small surfaces”, Nature 447, 537-539 (2007).

157. U. Chatterjee, D. K. Morr, M. R. Norman, M. Randeria, A. Kanigel, M. Shi, E. Rossi, A. Kaminski, H. M. Fretwell, S. Rosenkranz, K. Kadowaki and J. C. Campuzano, “Dynamic spin response function of the high temperature $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ superconductor from angle resolved photoemission spectroscopy”, Phys. Rev. B 75, 172504 (2007).

156. M. R. Norman, “Linear response theory and the universal nature of the magnetic excitation spectrum of the cuprates” Phys. Rev. B 75, 184514 (2007).

155. I. Paul, C. Pepin and M. R. Norman, “Kondo Breakdown and Hybridization Fluctuations in the Kondo-Heisenberg Lattice”, Phys. Rev. Lett. 98, 026402 (2007).

154. M. Dzero, M. R. Norman, I. Paul, C. Pepin, and J. Schmalian, “Quantum Critical End Point for the Kondo Volume Collapse”, Phys. Rev. Lett. 97, 185701 (2006).

153. A. Kanigel, M. R. Norman, M. Randeria, U. Chatterjee, S. Souma, A. Kaminski, H. M. Fretwell, S. Rosenkranz, M. Shi, T. Sato, T. Takahashi, Z. Z. Li, H. Raffy, K. Kadowaki, D. Hinks, L. Ozyuzer, and J. C. Campuzano, “Evolution of the pseudogap from Fermi Arcs to the nodal liquid”, Nature Phys. 2, 447-451 (2006).

152. A. Kaminski, S. Rosenkranz, H. M. Fretwell, M. R. Norman, M. Randeria, J. C. Campuzano, J-M. Park, Z. Z. Li, and H. Raffy, “Change of Fermi-surface topology in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ with doping”, Phys. Rev. B 73, 174511 (2006).

151. M. R. Norman and A. V. Chubukov, “High-frequency behavior of the infrared conductivity of the cuprates”, Phys. Rev. B 73, 140501(R) (2006).

150. U. Chatterjee, M. Shi, A. Kaminski, A. Kanigel, H. M. Fretwell, K. Terashima, T. Takahashi, S. Rosenkranz, Z. Z. Li, H. Raffy, A. Santander-Syro, K. Kadowaki, M. R. Norman,

M. Randeria, and J. C. Campuzano, "Non-dispersive Fermi arcs and absence of charge ordering in the pseudogap phase of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ", *Phys. Rev. Lett.* 96, 107006 (2006).

149. Michael Norman, "An Isotope Effect for Magnetic Pairing", *Nature Phys.* 2, 19-20 (2006).

148. M. R. Norman, D. Pines, and C. Kallin, "The Pseudogap: Friend or Foe of High T_c ?", *Adv. Phys.* 54, 715-733 (2005).

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4. M.R. Norman and D.D. Koelling, "The Langreth-Mehl Gradient Correction Applied to Transition Metal Band Structures: Cu and V", *Phys. Rev. B* 28, 4357-4362 (1984).
3. M.R. Norman, "The Self-Interaction Correction Applied to the Wannier Representation of the Electron Gas", *Phys. Rev. B* 28, 3585-3586 (1983).
2. M.R. Norman and J.P. Perdew, "A Simplified Self-Interaction Correction Applied to the Energy Bands on Neon and Sodium Chloride", *Phys. Rev. B* 28, 2135-2139 (1983).
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INVITED CONFERENCE TALKS

137. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 25-29, 2019, Telluride, CO
136. David Pines Symposium on Superconductivity Today and Tomorrow, Mar. 29-30, 2019, Urbana, IL
135. Bringing Holography to the Lab: Explaining Strange Metals with Virtual Black Holes, Jan. 7-11, 2019, Leiden, The Netherlands
134. Workshop on Machine Learning Quantum Materials, Aug. 3, 2018, Rockville, Maryland
133. Symposium on Materials Genome Towards Exascale, June 10-15, 2018, Spetses, Greece
132. AJL@80: Challenges in Quantum Foundations, Condensed Matter Physics, and Beyond, March 30-31, 2018, Urbana, IL
131. American Physical Society March Meeting, March 5-9, 2018, Los Angeles, CA
130. New Directions in Quantum Materials Research Workshop, Jan. 12, 2018, College Park, Maryland
129. Center for Computational Materials Sciences 2017 Fall Workshop, Oct. 26-27, 2017, Riverhead, NY
128. International Workshop on Multipole Physics and Related Phenomena, Sept. 24-28, 2017, Hachimantai, Japan
127. BES-CAS 5th Annual Workshop on Unconventional Superconductivity, July 26-28, 2017, Half Moon Bay, CA
126. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 26-30, 2017, Telluride, CO
125. German Physical Society Spring Meeting, Mar. 19-24, 2017, Dresden, Germany
124. Common Trends in the Electronic Phase Diagram of Unconventional Superconductors, Feb. 27 – Mar. 3, 2017, Leiden, The Netherlands
123. Quantum Testbeds Stakeholder Workshop, Feb. 14-16, 2017, Washington, DC
122. Materials and Mechanisms of Superconductivity, Aug. 23-28, 2015, Geneva, Switzerland
121. Concepts and Discovery in Quantum Matter, July 12-15, 2015, Cambridge, UK

120. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 8-12, 2015, Telluride, CO
119. Institute for Complex Adaptive Matter Annual Conference, May 11-13, 2015, Argonne, IL
118. High Energy Physics Advisory Panel Meeting, Dec. 8-9, 2014, Bethesda, MD
117. Quantum Criticality in Correlated Materials and Model Systems, July 21-Aug. 1, 2014, Natal, Brazil
116. Low Energy Electrodynamics in Solids, June 29-July 4, 2014, Amboise, France
115. From Nano to Cosmo, Nov. 1, 2013, Delft, The Netherlands
114. Competing Interactions and Colossal Responses in Transition Metal Compounds, July 15-19, 2013, Telluride, CO
113. Superconductivity 297K – Synthetic Routes to Room Temperature Superconductivity, Oct. 17-18, 2012, San Jose, CA
112. Strongly Correlated Physics in the Cuprates, Sept. 3-7, 2012, Montauk, NY
111. Innovations in Strongly Correlated Electron Systems, Aug. 6-17, 2012, Trieste, Italy
110. American Conference on Neutron Scattering, June 25-27, 2012, Georgetown University
109. 2012 NSLS/CFN Joint Users' Meeting, May 21-23, 2012, Brookhaven National Lab
108. From Quantum Foundations to Quantum Fluids, Apr. 4-6, 2012, Toulouse, France
107. American Physical Society March Meeting, Feb. 27-Mar. 2, 2012, Boston, MA
106. Electronic Structure of Novel Materials, Sept. 11-14, 2011, Ringberg, Germany
105. 13th International Workshop on Vortex Matter in Superconductors, Aug. 1-5, 2011, Chicago, IL
104. Competing Interactions and Colossal Responses in Transition Metal Compounds, July 18-22, 2011, Telluride, CO
103. 1st Centennial of Superconductivity, June 29-July 1, 2011, Cali, Columbia
102. Unconventional Superconductivity, Apr. 22-24, 2011, Minneapolis, MN
101. 4th MaNEP Winter School, Jan. 9-14, 2011, Saas-Fee, Switzerland

100. 19th Australian Institute of Physics Congress, Dec. 5-9, 2010, Melbourne, Australia
99. Center for Emergent Superconductivity Junior Workshop, Nov. 11, 2010, Stony Brook, NY
98. Quantum Materials Meeting, Oct. 13-17, 2010, Whistler, BC Canada
97. SRC Users' Meeting, Oct. 8-9, 2010, Stoughton, WI
96. Quantum Science of Strongly Correlated Systems, Sept. 27-30, 2010, Tokyo, Japan
95. Emergent Quantum States in Complex Correlated Matter, Aug. 23-27, 2010, Dresden, Germany
94. Strongly Correlated Electron Systems 2010, June 27-July 2, 2010, Santa Fe, NM
93. Physics of Complex Oxides, June 14-17, 2010, Santorini, Greece
92. American Physical Society March Meeting, March 15-19, 2010, Portland, Oregon
91. Materials by Design, Feb. 8-12, 2010, KITP, Santa Barbara, CA
90. Frontiers in Condensed Matter Physics, Dec. 16-19, 2009, KIAS, Seoul, South Korea
89. Advances in Light Source Science Past, Present and Future, Oct. 18, 2009, Stanford, CA
88. International Workshop on Strong Correlations and Angle Resolved Photoemission Spectroscopy, July 19-24, 2009, Zurich, Switzerland
87. Emergent Quantum Phenomena from the Nano to the Macro World, July 6-19, 2009, Cargese, Corsica, France
86. Emergence of Inhomogeneous Phases in Strongly Correlated Electron Systems, June 30-July 3, 2009, Paris, France
85. American Physical Society March Meeting, March 16-20, 2009, Pittsburgh, PA
84. Mini Workshop on FeAs Materials, Jan. 26, 2009, Toronto, Canada
83. Workshop on Cuprate Fermiology, Nov. 14-15, 2008, College Park, Maryland
82. Strong Correlations in Materials and Atom Traps, Aug. 4-15, 2008, Trieste, Italy
81. Low Energy Electrodynamics in Solids, June 30 – July 4, 2008, Whistler, BC Canada
80. Advanced Photon Source Users Meeting, May 4-8, 2008, Argonne, IL

79. American Physical Society March Meeting, March 9-14, 2008, New Orleans, LA
78. Tulane Density Functional Theory Fest, March 9, 2008, New Orleans, LA
77. 48th Sanibel Symposium, Feb. 21-26, 2008, St. Simons Island, GA
76. Properties of Cuprate Superconductors II, December 17-19, 2007, Munich, Germany
75. CIAR Quantum Materials Program Meeting, October 18-20, 2007, Lac Carling Resort, Quebec, Canada
74. BCS at 50, Oct. 10-13, 2007, Urbana, IL
73. Strong Correlations in Low Dimensional Transport and Dynamics, Sept. 3-6, 2007, Long Island, New York
72. Optical Sum Rules: Their Relevance to High T_c Superconductors and Correlated Systems, July 2-3, 2007, Rome, Italy
71. A. I. Larkin Memorial Conference, June 24-28, 2007, Chernogolovka, Russia
70. Strongly Correlated Electron Systems 2007, May 14-18, 2007, Houston, TX
69. Advanced Photon Source Users Meeting, May 7-12, 2007, Argonne, IL
68. Frontiers of Condensed Matter, April 20-22, 2007, Piscataway, NJ
67. American Physical Society March Meeting, March 5-9, 2007, Denver, CO
66. New States of Stable and Unstable Quantum Matter, Aug. 14-25, 2006, Trieste, Italy
65. Competing Interactions and Colossal Responses in Transition Metal Compounds, July 16-22, 2006, Telluride, CO
64. Frontiers in Correlated Matter, June 22-25, 2006, Snowmass, CO
63. Basic Research Needs for Superconductivity, May 8-11, 2006, Arlington, VA
62. Frontiers of Unconventional Superconductivity, Nov. 9, 2005, Bristol, UK
61. Strongly Correlated Electron Materials, SPIE Symposium on Optics and Photonics, July 31-August 4, 2005, San Diego, CA
60. 16th American Conference on Crystal Growth and Epitaxy, July 10-15, 2005, Big Sky, Montana

59. Strong Correlations and ARPES, April 4-10, 2005, Dresden, Germany
58. American Physical Society March Meeting, March 21-25, 2005, Los Angeles, CA
57. Yukawa International Seminar 2004, Nov. 1-19, 2004, Kyoto, Japan
56. ALS Photoemission Crosscutting Workshop, July 29-30, 2004, Berkeley, CA
55. Workshop on High T_c Superconductivity and Quantum Critical Phenomena, Oct. 20-26, 2003, Beijing, China
54. Lorentz Center Workshop on Non-Fermi Liquid Behavior and Quantum Phase Transitions, May 12-23, 2003, Leiden, The Netherlands
53. ICAM Workshop on Quantum Criticality, Mar. 20-23, 2003, New York, NY
52. Symposium on Superconductivity, Feb. 6, 2003, Evanston, IL
51. Gordon Research Conference on Superconductivity, Jan. 12-17, 2003, Ventura, CA
50. NATO Advanced Research Workshop on Concepts in Electron Correlation, Sept. 29-Oct. 3, 2002, Hvar, Croatia
49. 2nd Hvar Workshop on Strongly Correlated Electrons, Oct. 3-6, 2002, Hvar, Croatia
48. Emergent Materials and Highly Correlated Electrons, Aug. 5-16, 2002, Trieste, Italy
47. 3rd Telluride Summer Research Center Workshop on Magnetoresistance Oxides, July 14-20, 2002, Telluride, CO
46. Oxides with Remarkable Properties, June 9-15, 2002, Aussois, France
45. CIAR Superconductivity Program, May 4-6, 2002, Toronto, Canada
44. Quantum Critical Phenomena, April 22, 2002, Chicago, IL
43. Excitations in Unconventionally Ordered Metals, Oct. 26-28, 2001, Santa Fe, NM
42. Intl. Conference on Magnetic Correlations, Metal-Insulator Transitions, and Superconductivity in Novel Materials, July 16-20, 2001, Dresden, Germany
41. Spectroscopies of Novel Superconductors, May 13-17, 2001, Chicago, IL
40. Intl. Workshop on Novel Quantum Phenomena in Transition Metal Oxides, Nov. 13-15, 2000, Sendai, Japan

39. 2nd Telluride Summer Research Center Workshop on Magnetoresistance Oxides, July 16-22, 2000, Telluride, CO
38. Canadian Association of Physicists Congress, June 4-7, 2000, Toronto, Canada
37. CIAR Superconductivity Summer School, May 30-June 1, 2000, Toronto, Canada
36. American Physical Society March Meeting, March 20-24, 2000, Minneapolis, MN
35. Materials and Mechanisms of Superconductivity (M2S-HTSC-VI), Feb. 20-25, 2000, Houston, TX
34. Concepts in Electron Correlation, Sept. 20-30, 1999, Hvar, Croatia
33. XI Workshop on Strongly Correlated Electron Systems, July 12-23, 1999, Trieste, Italy
32. CIAR Superconductivity Program, May 18-20, 1999, Banff, Canada
31. High Temperature Superconductivity (HTS99), Jan. 6-13, 1999, Miami, FL
30. Mini Workshop on High Temperature Superconductors, Nov. 21, 1998, Hsinchu, Taiwan
29. Telluride Summer Research Center Workshop on Magnetoresistance Oxides, July 12-18, 1998, Telluride, CO
28. American Physical Society March Meeting, March 16-20, 1998, Los Angeles, CA
27. APCTP Workshop on Strongly Correlated Systems, Feb. 10-14, 1998, Phoenix Park, South Korea
26. SRC Workshop on Correlated Electron Systems, Oct. 25, 1997, Stoughton, WI
25. Spectroscopies in Novel Superconductors, Sept. 14-18, 1997, Cape Code, MA
24. Gordon Research Conference on Superconductivity, Jan. 12-17, 1997, Ventura, CA
23. Workshop on Fundamental Processes of Electron Transport in High T_c Junctions, Aug. 23-24, 1996, Argonne Natl. Lab
22. The Superconducting State with Modulated Order Parameter, June 3-6, 1996, Dresden, Germany
21. First Polish-US Conference on High Temperature Superconductivity, Sept. 11-15, 1995, Poland.
20. American Physical Society March Meeting, March 20-24, 1995, San Jose, CA

19. Stanford Conference on Spectroscopies in Novel Superconductors, March 15-18, 1995, Stanford, CA
18. International Conference on Strongly Correlated Electron Systems, Aug. 16-19, 1993, San Diego, CA
17. Mini-Symposium on Electronic Structure and Magnetism, May 7, 1993, Uppsala University, Sweden
16. Interacting Electrons in Heavy Fermion Compounds, Organic Molecular Metals, and High Temperature Superconductors, Oct. 23, 1992, Cambridge University, UK
15. 3rd Annual Workshop on Recent Developments in Electronic Structure Algorithms, Jun. 1-3, 1991, Cornell University, New York
14. Physical Phenomena at High Magnetic Fields, May 15-18, 1991, Florida State University, Florida
13. 31st Sanibel Symposium, Mar. 9-16, 1991, St. Augustine, Florida
12. 35th Annual Conference on Magnetism and Magnetic Materials, Oct. 29 - Nov. 1, 1990, San Diego, California
11. Eighteenth Midwest Solid State Theory Symposium, Oct. 13-14, 1990, Northwestern University, Illinois
10. Actinides-89, Sept. 25-29, 1989, Tashkent, USSR
9. International Conference on the Physics of Highly Correlated Metals, Sept. 11-15, 1989, Santa Fe, New Mexico
8. American Physical Society March Meeting, March 20-24, 1989, St. Louis, Missouri
7. Third North American Chemical Congress, June 5-11, 1988, Toronto, Canada
6. Fifteenth Midwest Solid State Theory Symposium, Oct. 16-17, 1987, Kent State University, Ohio
5. Workshop on Heavy Fermion and High T_c Superconductors, April 15-16, 1987, University of Illinois, Urbana, Illinois
4. Fifth International Conference on Valence Fluctuations, Jan. 5-9, 1987, Bangalore, India
3. International Workshop on Condensed Matter Theories, July 21-26, 1986, Argonne Natl. Lab., Illinois

2. Seventeenth Rare Earth Research Conference, June 8-12, 1986, Hamilton, Ontario
1. American Physical Society March Meeting, Mar. 31 - Apr. 4, 1986, Las Vegas, Nevada

CONFERENCE CHAIRMAN

11. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 25-29, 2019, Telluride, Colorado (co-organizer)
10. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 26-30, 2017, Telluride, Colorado (co-organizer)
9. Competing Interactions and Colossal Responses in Transition Metal Compounds, June 8-12, 2015, Telluride, Colorado (co-organizer)
8. Competing Interactions and Colossal Responses in Transition Metal Compounds, July 18-22, 2011, Telluride, Colorado (co-organizer)
7. Superconductor-Insulator Transition, Nov. 16-19, 2010, ANL (co-chair)
6. Vortices at Fifty Years, Nov. 7-8, 2008, ANL
5. Symposium in Honor of the 70th Birthday of Alexei Abrikosov, Nov. 6, 1998, ANL
4. Workshop on Poorly Conducting Metallic Oxides, June 10-12, 1998, ANL (co-chair)
3. The Pseudogap in High Temperature Superconductors: May 19-20, 1997, University of Illinois - Chicago (co-chair)
2. High Temperature Superconductors: Pairing State and Mechanism, June 13-17, 1994, ANL (co-chair)
1. Superconductors in a Magnetic Field, August 24-28, 1992, ANL

OTHER CONFERENCE ACTIVITY

14. Strongly Correlated Electron Systems 2019, Sept. 23-28, 2019, Okayama, Japan (international advisory committee)
13. Strongly Correlated Electron Systems 2017, July 17-21, 2017, Prague, Czech Republic (international advisory committee)
12. Strongly Correlated Electron Systems 2016, May 9-13, 2016, Hangzhou, China (international advisory committee)
11. Low Energy Electrodynamics in Solids 2016, May 30 – June 3, 2016, Biwa Lake, Japan (program committee)
10. 27th International Conference on Low Temperature Physics, Aug. 6-14, 2014, Buenos Aires,

Argentina (program committee)

9. Strongly Correlated Electron Systems 2014, July 7-11, 2014, Grenoble, France (international advisory committee)
8. Low Energy Electrodynamics in Solids 2014, June 29 – July 4, 2014, Domaine Saint Hilaire, France (program committee)
7. Strongly Correlated Electron Systems 2013, Aug. 5-9, 2013, Tokyo, Japan (international advisory committee)
6. Materials and Mechanisms in Superconductivity 2012 (program committee co-chair)
5. Strongly Correlated Electron Systems 2011, Aug. 29 – Sept. 3, 2011, Cambridge, England (program committee)
4. 26th International Conference on Low Temperature Physics, Aug. 10-17, 2011, Beijing, China (advisory board)
3. International Conference on Neutron Scattering, May 3-7, 2009, Knoxville, TN (program committee)
2. Gordon Research Conference on Superconductivity, Jan. 22-27, 2006, Buellton, CA (discussion leader)
1. Spectroscopies in Novel Superconductors, March 17-19, 1993, Santa Fe, NM (conference summarizer)

ORGANIZING COMMITTEE

9. Workshop on Quantum Sensing, Dec. 12-14, 2017, Argonne National Laboratory
8. Discovery in Basic Energy Sciences: The Role of Computing at the Extreme Scale, Aug. 13-15, 2009, Washington, DC
7. Critical Issues Related to Higher Temperature Superconductors, June 22-26, 2009, KITP, Santa Barbara, CA
6. Possibility of Room Temperature Superconductivity, June 10-11, 2005, Univ. of Notre Dame
5. Quantum Phase Transitions, Jan. 10 – Apr. 29, 2005, KITP, Santa Barbara, CA
4. Pseudogaps in Strongly Correlated Metals, Aug. 9 – Sep. 12, 2004, Aspen, CO
3. Spectroscopies in Novel Superconductors, May 14-18, 2001, Chicago, IL

2. Fundamental Processes of Electron Transport in High T_c Junctions, Aug. 23-24, 1996, Argonne National Laboratory

1. Electronic Properties of Disordered Systems, Aug. 23-27, 1993, Argonne National Laboratory

ADVISORY COMMITTEE

5. Center for Computational Materials Sciences, Brookhaven National Laboratory, 2015-present

4. U S Dept. of Energy, Basic Energy Sciences subcommittee on Facing our Energy Challenges, 2008-2009

3. Science Advisory Board, UC/ANL Joint Theory Institute, 2006-2009

2. U S Dept. of Energy, Basic Energy Sciences subcommittee on Theory and Computation, 2004

1. Canadian Institute for Advanced Research, Superconductivity Program, 1998-2003 (Chair)

POSTDOCS SUPERVISED

1. Carlos Sa de Melo (1991-1993)

2. Roland Fehrenbacher (1993-1995)

3. Yuri Vilks (1995-1997)

4. Denis Golosov (1996-1998)

5. Gianfranco Preosti (1997-1998)

6. Boldizsar Janko (1998-1999)

7. Matthias Eschrig (1999-2001)

8. Yaroslav Bazaliy (2000-2003)

9. Revaz Ramazashvili (2001-2004)

10. Alexios Klironomos (2003-2006)

11. Indranil Paul (2005-2007)

12. Ashot Melikyan (2006-2008)

13. Tobias Micklitz (2007-2009)

14. Zoran Ristivojevic (2009-2010)

15. Alex Levchenko (2009-2011)

16. Jie Lin (2009-2011)

17. Victor Vakaryuk (2010-2012)

18. Jasper van Wezel (2010-2012)

19. Vivek Mishra (2012-2015)
20. Antia Botana (2015-2018)

INVITATIONS TO LECTURE

1. Angstrom Laboratory (Uppsala, Sweden)
2. Argonne National Laboratory
3. Bell Laboratories
4. Boston College
5. Brookhaven National Laboratory
6. University of Bristol (United Kingdom)
7. California Institute of Technology
8. Cambridge University (United Kingdom)
9. Chalk River Nuclear Lab (Canada)
10. University of Chicago
11. Columbia University
12. ESPCI, Paris (France)
13. Fermi National Accelerator Laboratory
14. University of Florida
15. Florida State (National High Magnet Field Lab)
16. University of Georgia
17. Harvard University
18. High Field Magnet Lab (Grenoble, France)
19. ILL, Grenoble (France)
20. University of Illinois, Chicago
21. University of Illinois, Urbana
22. Illinois Institute of Technology
23. Imperial College (United Kingdom)
24. Indiana University
25. Josef Stephan Institute (Slovenia)
26. Kavli Institute for Theoretical Physics, Santa Barbara, CA

27. Los Alamos National Laboratory
28. Louisiana State University, Shreveport
29. Louisiana State University, Baton Rouge
30. University of Manchester (United Kingdom)
31. University of Maryland
32. Massachusetts Institute of Technology
33. McGill University (Canada)
34. Michigan Technological University
35. National Center for Theoretical Sciences (Taiwan)
36. University of Nevada, Las Vegas
37. Northwestern University
38. Notre Dame University
39. Oak Ridge National Laboratory
40. Ohio State University
41. Universite Paris Sud (France)
42. Princeton Plasma Physics Laboratory
43. Princeton University
44. Purdue University
45. Rutgers University
46. University of California – Santa Barbara
47. SPhT, Saclay (France)
48. University of Sheffield (United Kingdom)
49. Universite de Sherbrooke (Canada)
50. University of South Carolina
51. Stanford University
52. Temple University
53. University of Tennessee
54. University of Toronto (Canada)
55. Tulane University
56. University of Virginia
57. University of Wisconsin, Madison