July 2017

Curriculum vitae for Milind Kunchur

Address: University of South Carolina, Department of Physics and Astronomy, Columbia, SC 29208
Education: Ph.D. in Physics, Rutgers University, 1988.

Professional recognition and experience:
- Governor's Distinguished Professor since 2014. Michael J. Mungo Distinguished Professor since 2012.
- Professor of Physics and Astronomy, University of South Carolina (Aug. 2005—present).
- Associate Professor of Physics and Astronomy, University of South Carolina (Aug. 2000—July 2005).
- Assistant Professor of Physics and Astronomy, University of South Carolina (Jan. 1997—July 2000).
- NRC Senior Fellow at Wright Patterson Air Force Base (June 1995—Dec. 1996).
- ORISE Research Associate at Oak Ridge National Laboratory (Nov. 1991—June 1995).
- Postdoctoral Research Associate at University of Virginia (July 1988—Sept. 1991).

Honors and accomplishments (research):
- Fellow of the American Physical Society since 2012.
- Donald S. Russell Award for Research in Science, Mathematics, and Engineering (2014). USC's highest research award
- ORAU Ralph E. Powe Junior Faculty Enhancement Award (1998).
- University of South Carolina Research and Productive Scholarship Award (1997).
- Martin-Marietta Publication and Technical Achievement Award (1995).
- National Research Council Senior Fellowship (1995).
- 136 invited talks (including 4 invited talks at American Physical Society March Meetings).
- 50 first/corresponding-author refereed publications (8 Phys. Rev. Letters, 5 book chapters, 4 review articles).
- Work cited in college-level textbooks in Superconductivity and Music Psychology, and in over 65 research-level books and review articles. Work highlighted 10 times in Nota Bene column of High-Tc update newsletter.
- Three prizes in undergraduate Physics competitions (two from India Physics Association).

Honors and accomplishments (general):
- Carnegie Foundation &CASE U.S. Professors of the Year Award (2014 SC winner) www.usprofessorsoftheyear.org
- Governor's Professor of the Year for the State of South Carolina (2014). State's highest honor for academia
- George B. Pegram Medal from SESAPS for 'Excellence in Physics Education in the Southeast U.S.' (2014).
- Michael J. Mungo Distinguished Professor of the Year at the Univ. of South Carolina (2012). USC's highest honor
- Michael A. Hill Outstanding Faculty Member award (2017).
- Michael J. Mungo Teaching Award at the University of South Carolina (2001).
- Post-tenure review: "Superior" ratings in all 3 categories of Research, Teaching, and Service (2011).
- Highest ratings in all Peer-Review-of-Teaching evaluations (1999, 2000, 2004, 2009, 2013, 2017): Peer review reports

Research assistants and thesis mentees in the past 3 years:
- Graduate students: Charles Dean, Nahid Moghaddam, Stacy Varner, Dheyaa Alameri, Manlai Liang
- Undergraduate students: Andrew Lyons, Collin Johnson, Elizabeth Minten, Habiba Fayyaz, Keiko Bridwell, Akhila Padi, Taylor Jones, Elizabeth Minten, Justin Putnam, Nathan Moisson, Kevin Wood, Janki Patel,

Synergistic activities:
- Advisory Board Member of *Physica C* journal 2012—present.
- NSF panels 2000, 2005, and 2014.
- Secretary and member-at-large of SACS-AAPT (South Atlantic Coast Sect. of the American Assoc of Physics Teachers).
- Strategic Research Panel for the U.S. Department of Energy Superconductivity Peer Review (2005).
- Refereeing of proposals for NSF, DOE, ORISE, and Research Corp.
  Refereeing of manuscripts for PRL, PRB, APL, and Physica C.
- "Friend of APS" membership liaison for University of South Carolina 2006—present.
- SPS (Society of Physics Students) faculty advisor and outreach coordinator 2000—2008.
- Symposium-organizer/session chair at APS, MRS, EPS, SESAPS plus various topical conferences. Society abbreviations.
- University committees: Tenure Review Board (chair), University Committee on Tenure and Promotion, Professor of the Year Award Selection Committee, Russell Research Award Committee (chair), Post-tenure-Review Committee (chair).

Professional society memberships: APS (Fellow, life), SESAPS (life), DCMP (life), SACS-AAPT (life). Soc. abbrevs..

Current project funding: Department of Energy (Basic Energy Sciences), *Dissipative and fast-timescale phenomena in superconductors*, PI (single investigator): M. N. Kunchur, $1,796,181 through 7/15/2018.

SOME PRINCIPAL SCIENTIFIC RESULTS

CONDENSED MATTER PHYSICS

Metal-insulator transition

1. First experimental demonstration that it is possible for the superconductor-insulator and metal-insulator transitions to not coincide: *Absence of Superconductivity in Metallic Granular Aluminum,* M. Kunchur, P. Lindenfeld, W. L. Mclean, and J. S. Brooks, Phys. Rev. Lett. 59, 1232 (1987); *Superconductivity and the metal-insulator transition*…, T. A. Miller, M. Kunchur, Y. Z. Zhang, P. Lindenfeld, and W. L. McLean, Phys. Rev. Lett. 61, 2717 (1988).

2. Showed that the normal state of *YBCO is metallic as T→0 and not insulating* (contrary to the conclusion from high pulsed magnetic field studies): *Metallic normal state of YBaCuO*, M. N.Kunchur, B. I. Ivlev, D. K. Christen, and J. M. Phillips, Phys. Rev. Lett. 84, 5204 (2000).

Superconductivity: Magnetization

3. Discovered a new memory effect in magnetic decay that we showed to be based on flux creep and not glassy relaxation: *Superposition of decaying flux distributions: A memory effect from flux creep*, M.N. Kunchur, S.J. Poon, and M.A. Subramanian, Phys. Rev. B 41, 4089 (1990).

Superconductivity: Isotope effect

4. First experimental evidence that HTSc can in fact show a large (α~0.5) isotope effect. This result has over 300 citations and has been discussed in several books. *Anomalous oxygen isotope effect in LaSrCuO*, M. K. Crawford, M. N. Kunchur, W. E. Farneth, E. M. McCarron III, and S. J. Poon, Phys. Rev. B 41, 282 (1990).

Superconductivity: Current induced depairing

5. First measurement of the depairing current in any high-T_C superconductor: *Pair-breaking effect…YBaCuO*, M. N. Kunchur, D. K. Christen, C. E. Klabunde, and J. M. Phillips, Phys. Rev. Lett. 72, 752 (1994).

6. The most complete experimental study (in terms of temperature range and comprehensive tests of theory) of the phenomenon of current-induced pair breaking: *Current-Induced Pair Breaking in Magnesium Diboride*, M. N. Kunchur, Topical Review in J. Phys.: Condens. Matter 16, R1183-R1204 (2004).

Superconductivity: Time dependence

7. First real-time correlated current-voltage demonstration of the first London equation: *Ballistic acceleration of a supercurrent in a superconductor*, G. F. Saracila and M. N. Kunchur, Phys. Rev. Lett. 102, 077001 (2009).

Superconductivity: Flux dynamics

8. First quantitative confirmation that free flux flow indeed obeys something close to the Bardeen-Stephen formula, when high pulsed currents are used to overcome pinning. This result is cited in Tinkham's superconductivity textbook. *Observation of free flux flow at high dissipation levels in YBaCuO epitaxial films*, M. N. Kunchur, D. K. Christen, and J. M. Phillips, Phys. Rev. Lett 70, 998 (1993).

9. Later high-precision measurements in low-pinning MoGe films provided the first detailed investigation of free flux flow beyond the Bardeen-Stephen approximation. This was able to distinguish between the results of TDGL and Larkin-Ovchinnikov theories: *Evaluating free flux flow in low-pinning molybdenum-germanium superconducting films*, M. Liang, M. N. Kunchur, J. Hua and Z. Xiao, Phys. Rev. B 82, 064502 (2010).

10. High pulsed currents were also used to elucidate the *Hall effect in YBa2Cu3O7 in the limit of free flux flow,* M. N. Kunchur, D. K. Christen, C. E. Klabunde, and J. M. Phillips, Phys. Rev. Lett. 72, 2259 (1994).

11. New mechanism for a *vortex instability* based on the expansion of the core due to hot electrons (as opposed to the core shrinkage that occurs in the Larkin-Ovchinnikov mechanism) with quantitative experimental confirmation. Recently many other groups are reinterpreting their results based on this model rather than the LO mechanism. *Unstable flux flow due to heated electrons in Y-Ba-Cu-O films*, M. N. Kunchur, Phys. Rev. Lett. 89, 137005 (2002). *Energy relaxation at a hot-electron vortex instability*, J. M. Knight and M. N. Kunchur, Phys. Rev. B 74, 64512 (2006). *Vortex instability in…*M. Liang and M. N. Kunchur, Phys. Rev. B 82, 144517 (2010).

12. Discovered quantized *Steps in the negative-differential-conductivity regime of a superconductor,* M. N. Kunchur, B. I. Ivlev, and J. M. Knight, Phys. Rev. Lett. 87, 177001 (2001) by conducting voltage biased pulsed measurements beyond the vortex instability. Also *Shear fragmentation of unstable flux flow*, M. N. Kunchur, B.I. Ivlev, and J. M. Knight, Phys. Rev. B

66, 60505 (2002). These effects had never been observed or theoretically predicted before; they are the superconducting analog of the *Gunn effect* in semiconductors.

13. Found *Anomalous flux dynamics in magnesium diboride films*, M. N. Kunchur, G. Saracila, D. A. Arcos, Y. Cui, A. Pogrebnyakov, P. Orgiani, X. X. Xi, P. W. Adams, and D. P. Young, Physica C 437-438, 171-175 (2006): Disorderd MgB_2 shows a very strange behavior in that the R(T) curves show almost no broadening in shape with increasing B, only a parallel shift due to $B_{c2}(T)$—as if vortex motion is frozen even for currents approaching the depairing value. The system behaves like a highly conductive normal metal rather than the mixed state. We showed that because MgB_2 has abnormally slow branch-imbalance relaxation, the electric field extends well outside the vortex core. The viscous coefficient then rises linearly with B (instead of being constant) with a conductance that is independent of B as described in *Flux flow in a two-band superconductor with delocalized electric fields*, J. M. Knight and M. N. Kunchur, Phys. Rev. B 77, 024516 (2008) and *High-field flux dynamics in disordered two-band superconductivity*, J. M. Knight and M. N. Kunchur, book chapter no. 7, pg. 71 in "Electron Transport in Nanosystems", Eds. J. Bonca and S. Kruchinin, Springer Publishers (ISBN: 978-1-4020-9144-5), Dordrecht, The Netherlands (2008).

14. Observed the *Vortex Explosion* effect for the first time when the dimensions of the sample equal 4.4ξ as predicted by Likharev more than 30 years ago. M. N. Kunchur, M. Liang, and A. Gurevich, Phys. Rev. B 86, 024521 (2012).

Anomalous universal oscillations in magnetoresistance

15. This is a completely new and unexpected phenomenon that defies explanation. An anomalous oscillatory magnetoresistance was discovered in five different superconducting systems varying from cuprates and niobium compounds, to interfacial superconductivity between a topological insulator and a chalcogenide. Remarkably, the oscillation period of ~0.1 T is essentially independent of material, sample dimensions, temperature, transport current, and magnitude and orientation of the magnetic field. The universality of these oscillations cannot be reconciled with any previously established mechanisms. In collaboration with Boris Ivlev, a preliminary theory based on a radically new type of subatomic electronic structure arising from QED has been proposed, M. N. Kunchur, C. L. Dean, and B. I. Ivlev, Phys. Rev. B 94, 054504 (2016).

PSYCHOACOUSTICS AND AUDITORY NEUROPHYSIOLOGY

There has been a decades-old paradox in high-fidelity audio that very minute differences in audio gear quality and setup—resulting in time-domain errors in microseconds—are audible even though from a frequency standpoint they ought to be subliminal (since the upper frequency limit f_C of young humans is 18 kHz and much lower in older individuals). Previous formal psychoacoustics research had not found a violation of the $f \sim 1/\Delta t$ relationship (even though it need not apply to a non-linear system such as human hearing).

Borrowing technology from the high pulsed-current methods used in superconductors, new instrumentation and blind testing protocols were developed that achieved drastically higher sensitivity than previous work in this field. The entire signal chain was analog (the signal source was a thousand times faster than a compact disk).
Time alterations were introduced mechanically (moving speakers back and forth with a micrometer screw) as well as with in-house built ultrapure RC filters. A spectrum analyzer arrangement was developed that vastly surpassed commercial instruments and bettered the human ear (albeit for repetitive signals). The entire project took five years but the end result of 3 experiments (2 using headphones and one using speakers) was the concrete proof that humans could discern a $\Delta t \sim 5$ μs: *Temporal resolution of hearing probed by bandwidth restriction*, M. N. Kunchur, Acta Acustica united with Acustica 94, 594–603 (2008) and *Audibility of temporal smearing and time misalignment of acoustic signals*, M. N. Kunchur, Technical Acoustics, 17 (2007).
Besides the experiments, two conceptually new theoretical models (one for repetitive signals—based on non-linear mixing, and one for transients—based on synchronous neural convergences along ascending pathways) were developed that showed quantitatively that microsecond resolution should be possible in the time domain, almost independent of the upper frequency hearing limit. This theory is also presented in the above papers.

The 5 μs result has become the new upper bound for human time resolution that is being adopted by textbooks (e.g., … *An Introduction to Music Psychology*, by Donald and Sebald) and has impacted the consideration of new digital audio standards (e.g, see 128th AES Convention). This work has also been featured in popular audio magazines (e.g., article by George Foster in the British magazine *Hificritic*) and has been discussed on virtually all audio web sites (www.stereophile.com, www.avsforum.com, www.diyaudio.com, www.audioasylum.com, twogoodears.blogspot.com, www.audiokarma.org, www.hydrogenaudio.org, etc.).

LISTS OF TALKS, PUBLICATIONS, ETC.

Invited presentations at conferences:

1. *Dissipative-regime measurements as a tool for confirming and characterizing near-room-temperature superconductivity*, 'Towards Room Temperature Superconductivity: Superhydrides and More' Workshop, Los Angeles, CA, May 2017.
2. *Neurophysiology of time resolution in human hearing*, USC Neuroscience Community Retreat,Columbia, SC, May 2017.
3. *Superconductivity and oscillatory magnetoresistance at a topological-insulator/chalcogenide interface*, The 61st Annual DAE Solid Solid State Physics Symposium, Bhubaneshwar, India, Dec 26-30, 2016.
4. *Superconductivity at a topological-insulator/chalcogenide interface probed through current-induced depairing*, Energy Materials Nanotechnology (EMN) meeting in Prague, Czech Republic, June 21—24, 2016.
5. *Dissipative and fast-timescale phenomena in superconductors*, U.S. Department of Energy, ECMP Meeting in Gaithersburg, Maryland, Sept. 28—30, 2015.
6. *Short-timescale and high-current effects in superconductors,* Collaborative conference on 3D and Materials Research (CC3DMR), Busan, South Korea, June 15-19, 2015.
7. *Dissipative and fast time-scale studies*, Collaborative Conference on Materials Research (CCMR), Incheon-Seoul, South Korea, June 23–27, 2014
8. *Limitations in current density and dissipation in superconductors*, International Conference on Superconductivity for Energy, Paestum (Salerno), Italy, May 15-19, 2014.
9. *Novel transport phenomena in thin superconducting films in parallel magnetic fields*, Collaborative Conference on Materials Research (CCMR) 2014, Seoul, South Korea, June 23—27, 2014.
10. *The mixed state in the confined geometry of parallel fields in thin films*, NATO International Conference on Electron Correlation in Nanostructures (ECN-2013), Yalta, Ukraine, October 3–6, 2013.
11. *The Vortex Explosion Transition,* The 57th Annual DAE-SSPS (Department of Atomic Energy – Solid State Physics Symposium) in Mumbai, India, Dec. 3–7, 2012.
12. *Some neurophysiological mechanisms that can influence the time resolution of hearing and some psychophysical experiments used to evaluate those auditory thresholds*, 128th AES Convention, London, U.K., May 2010.
13. *The ballistic acceleration of the supercurrent in a superconductor*, NATO Advanced Research Workshop on Physical Properties of Nanosystems, Yalta, Ukraine, September 2009.
14. *The ballistic acceleration of the supercurrent in a superconductor*, The Joint JSPS-ESF International Conference on Nanoscience and Engineering in Superconductivity, Tsukuba, Japan, March 2009.
15. *The anomalous flux dynamics of MgB_2*, NATO Advanced Research Workshop on Electronic Transport in Nanosystems, Yalta, Ukraine, September 18, 2007.
16. *The anomalous flux dynamics of MgB_2*, Superconductivity Conference at UASLP, San Louis Potosi, Mexico, August 31, 2007.
17. *A new hybrid type I -- type II superconductivity in magnesium diboride*, 51st DAE Solid State Physics Symposium, Bhopal, India, December 27, 2006.
18. *Unusual transport characteristics of superconducting MgB_2 microbridges,* JSPS/ESF International Conference on "Vortex matter in nanostructured superconductors", Crete, Greece, September 2005.
19. *The perception and high fidelity reproduction of music,* 2005 Annual March Meeting of the APS, Los Angeles, CA, March 2005.
20. *Dissipation due to vortex motion in superconductors,* Third International Symposium on "Future Oriented Interdisciplinary Materials Science … ", Tsukuba, Japan, November 2004.
21. *Current-Induced Pair Breaking in Magnesium Diboride*, at the 2003 Annual Meeting of the Southeastern Section of the American Physical Society (SESAPS).
22. *Hot-electron Instability and Flux Fragmentation*, International Workshop on Unconventional Superconductors, Campinas, Brazil, May 20-24, 2003.
23. *Hot-electron instability in vortex motion,* 2003 APS March Meeting in Austin, March 5, 2003.
24. *Unstable and Nascent Vortices*, given at the Carolina Vortex Workshop, Columbia, October 19, 2002.
25. *Instabilities and other effects in highly driven vortex motion,* given at the International Conference on Modern Problems of Superconductivity, Yalta, Ukraine, September 12, 2002.
26. *Unstable vortex motion in superconductors at low temperatures, given at* the 19th General Conference of the EPS Condensed Matter Division, Brighton, United Kingdom, April 9, 2002.
27. *Instabilities and other Effects in the Supersonically Driven Vortices,*given at the Workshop on Vortex Dynamics and Dissipation in High-T_c Superconductors, Budapest, Hungary, April 26, 2001.
28. *Unstable Flux Flow and the Normal State of YBaCuO at Low Temperatures,* given at the 2000 APS March Meeting in Minneapolis, March 22, 2000.
29. *Nonlinear Flux Flow at Low Temperatures,* given at the Workshop on the Microscopic Structure and Dynamics of Vortices in Unconventional Superconductors, Dresden, March 1, 2000.
30. *Vortex Instability and the Normal State at Low Temperatures,* given at the Sixth International Conference on Materials and Mechanisms of Superconductivity, Houston, Feb. 24, 2000.
31. *High-frequency Effects in Superconductors from Short-Duration DC pulses*, given at the ``Advances in superconductivity and its Applications to Microwaves'' (ASAM'98) conference, Delhi, Dec.14, 1998.

32. *High-power measurements of vortex dynamics*, given at Midwest Superconductivity Consortium Summer School, W. Lafayette, July 25, 1997.
33. *Transport Behavior in Superconductors at Extreme Dissipation Levels,* given at the ``International Symposium on Advances in Superconductivity: New Materials, Critical Currents, and Devices'', Mumbai, September 18, 1996.
34. *Novel Transport Behavior in the Dissipative Regime of $YBa_2Cu_3O_7$,* given at the 1994 Fall MRS meeting in Boston, MA, November 30, 1994.
35. *Mixed-State Transport at High Current Densities,* given at "Workshop on Statics and Dynamics of Vortices in Superconductors", LT-20 conference, Eugene, Oregon, August 1--3, 1993.
36. *Free Flux Flow in $YBa_2Cu_3O_7$ Films,* 1993 APS March meeting in Seattle, WA, March 1993**.**

Contributed conference presentations: ~50 contributed presentations.

Key-note speeches and public talks:
1. Key-note commencement speaker at the Doctoral Hooding Ceremony, University of South Carolina, May 10, 2014.
2. Key-note speaker for Incoming Student Convocation for Class of 2016, University of South Carolina, August 2012.
3. USC Center for Teaching Excellence (CTE), "Engaging Non-Majors", February 27, 2013.
4. The Last Lecture Series, University of South Carolina, "Bridging Subjectivism with Science", November 13, 2013.
5. Science Café organization, Capital City Club, "High-Fidelity Sound Reproduction", March 9, 2010.

Colloquia and seminars:
1. University of California at Los Angeles, Department of Electrical Engineering, May 10, 2017 (seminar).
2. Palmetto Richland Memorial Hospital (televised to other hospitals), December 11, 2014 (Neurology Grand Rounds).
3. Francis Marrion University, Department of Physics and Astronomy, February 27, 2014 (colloquium).
4. Univ. of South Carolina, Dept. of Physics and Astronomy, on January, 2013 (colloquium).
5. Indian Institute of Science Education and Research (IISER), December 18, 2012 (colloquium).
6. College of Charleston, Department of Physics and Astronomy, October 20, 2011 (colloquium).
7. Univ. of South Carolina, Electrical Engineering Dept., February 2, 2010 (guest lecture).
8. National Chemical Laboratory, Pune, Dec. 13, 2010 (colloquium).
9. Fergusson College, Physics Department, Pune, Dec. 11, 2010 (colloquium).
10. S. P. College, Physics Department, Pune, Dec. 16, 2010 (colloquium).
11. University of Georgia, Department of Physics and Astronomy, October 8, 2009 (colloquium).
12. University of Georgia, Department of Physics and Astronomy, October 8, 2009 (seminar).
13. University of Pune, Department of Physics, January 3, 2009 (seminar).
14. University of Pune, Department of Physics, January 1, 2009 (colloquium).
15. Indian Institute of Science Education and Research (IISER), January 5, 2009 (colloquium).
16. Tata Institute of Fundamental Research, December 26, 2008 (seminar).
17. Indira Gandhi Centre for Atomic Research (IGCAR), December 22, 2008 (seminar).
18. Indira Gandhi Centre for Atomic Research (IGCAR), December 23, 2008 (colloquium).
19. Univ. of South Carolina, Dept. of Physics and Astronomy, on October 23, 2008 (colloquium).
20. Northern Illinois University, Department of Physics, April 18, 2008 (colloquium).
21. Argonne National Laboratory, Materials Science Division, April 15, 2008 (seminar).
22. University of South Carolina Nanocenter, January 23, 2008 (seminar).
23. Universidad Autonoma de San Luis Potosí, Mexico, August 29, 2007 (colloquium).
24. Oak Ridge National Laboratory, (colloquium) August 21, 2007.
25. Oak Ridge National Laboratory, (seminar) August 20, 2007.
26. University of South Carolina, (colloquium) February 15, 2007.
27. University of Pune, (colloquium) January 5, 2007.
28. University of Pune, (colloquium) January 4, 2007.
29. Tata Institute of Fundamental Research, (colloquium) December 22, 2006.
30. Tata Institute of Fundamental Research, (seminar) December 21, 2006.
31. Bhabha Atomic Research Centre, (seminar) December 19, 2006.
32. Bhabha Atomic Research Centre, (colloquium) December 18, 2006.
33. University of South Carolina, (colloquium) September 22, 2005.
34. University of California at Irvine, (seminar) March 22, 2005.

35. Columbia Student Chapter of the Audio Eng. Society, (guest lecture) February 21, 2005.
36. Iowa State University, (seminar) December 7, 2004.
37. Iowa State University, (colloquium) December 6, 2004.
38. University of Georgia, (seminar) October 14, 2004.
39. University of Georgia, (colloquium) October 14, 2004.
40. Tata Institute of Fundamental Research, (seminar1) August 11, 2004.
41. Tata Institute of Fundamental Research, (seminar2) August 11, 2004.
42. Bhabha Atomic Research Centre, (seminar1) 9, Mumbai, August 2004.
43. Bhabha Atomic Research Centre, (seminar2) August 9, 2004.
44. University of Pune, (colloquium) August 6, 2004.
45. University of Pune, (seminar) August 7, 2004.
46. Rutgers University, (seminar) October 28, 2003.
47. Rutgers University, (colloquium) October 29, 2003.
48. Argonne National Laboratory, June 11, 2003.
49. University of South Carolina, Department of Physics and Astronomy, March 20, 2003.
50. University of South Carolina, Department of Physics and Astronomy, October 17, 2002.
51. University of Cambridge, U.K., April 12, 2002.
52. University of Georgia, February 6, 2002.
53. University of Maryland, College Park, July 9, 2001
54. ETH, Zurich, Switzerland, May 29, 2000.
55. University of Tubingen, Tubingen, Germany, May 25, 2000.
56. University of Virginia, Department of Physics, October 14, 1999.
57. University of Georgia, Department of Physics and Astronomy, September 23, 1999.
58. Clemson University, Department of Physics and Astronomy, August 26, 1999.
59. Oak Ridge National Laboratory, Solid State Division, July 22, 1999.
60. University of South Carolina, Department of Electrical Engineering, June 3, 1999.
61. University of South Carolina, Department of Physics and Astronomy, April 15, 1999.
62. University of South Carolina, Department of Chemistry and Biochemistry, Feb. 1, 1999.
63. Bhabha Atomic Research Centre, Mumbai, December 24, 1998.
64. Tata Institute of Fundamental Research, Mumbai, December 22, 1998.
65. College of Charleston, Charleston, September 29, 1998.
66. University of Kansas, Lawrence, April 23, 1998.
67. University of Michigan, December 10, 1996.
68. Ohio State University, October 23, 1996.
69. University of Cincinnati, October 16, 1996.
70. Indian Institute of Technology, Powai/Mumbai, October 9, 1996.
71. University of Pune, Pune, October 2, 1996.
72. National Chemical Laboratory, Pune, September 30, 1996.
73. Indian Institute of Science, Bangalore, September 24, 1996.
74. Society for Applied Microwave Electronics and Engineering Research, Mumbai, Sept. 13, 1996.
75. Bhabha Atomic Research Centre, Mumbai, September 11, 1996.
76. University of Dayton, April 19, 1996.
77. University of South Carolina, April 11, 1996.
78. Georgetown University, November 30, 1995.
79. Wright State University, October 13, 1995.
80. Clemson University, April 27, 1995.
81. Cornell University, April 21, 1995.
82. University of Tennessee, Knoxville, February 20, 1995.
83. University of Minnesota, January 31, 1995.
84. Iowa State University, January 26, 1995.
85. University of Illinois at Urbana-Champaign, January 24, 1995.

86. Argonne National Laboratory, January 23, 1995.
87. Rutgers University, September 27, 1994.
88. University of Pittsburgh, April 26, 1994.
89. Carnegie-Mellon University, March 18, 1994.
90. University of Virginia, March 10, 1994.
91. Purdue University, West Lafayette, October 8, 1993.
92. University of Maryland, College Park, July 1, 1993.
93. Oak Ridge National Laboratory, August 21, 1992.
94. Oak Ridge National Laboratory, June 28, 1991.
95. University of Virginia, April 1991.
96. E. I. du Pont de Nemours and Company, April 21, 1989.
97. University of Virginia, May 1988.
98. University of Illinois at Urbana-Champaign, April 1988.

Refereed publications:

1. *The pair-breaking current and basic parameters of the superconducting state*, M. N. Kunchur, invited review article for *Physics News* (in press, 2017).
2. *Dissipative-regime measurements as a tool for confirming and characterizing near-room-temperature superconductivity*, C. L. Dean and M. N. Kunchur, invited review paper submitted to Quantum Studies: Mathematics and Foundations (in press, 2017).
3. *Superconductivity and oscillatory magnetoresistance at a topological-insulator/chalcogenide interface*, C. L. Dean, M. N. Kunchur, N. Shahesteh-Mogaddam, S. D. Varner, J. M. Knight, B. I. Ivlev, Q. L. He, H. Liu, J. Wang, R. Lortz, and I. K. Sou, AIP Conf. Proc. 1832, 020001 (2017).
4. *Anomalous oscillatory magnetoresistance in superconductors*, M. N. Kunchur, C. L. Dean, and B. I. Ivlev, Phys. Rev. B. 94, 054504 (2016).
5. *Current driven vortex-antivortex pair breaking and vortex explosion in the Bi2Te3/FeTe interfacial superconductor*, C. L. Dean, M. N. Kunchur, Q.L. He, H. Liu, J. Wang, R. Lortz, I.K. Sou, Physica C527, 46 (2016).
6. *Energy Losses in Superconductors*, C. L. Dean and M. N. Kunchur, J. of Power and Energy Eng. 4, 20 (2016).
7. *Current induced depairing in the Bi2Te3/FeTe interfacial superconductor*, M. N. Kunchur, C. L. Dean, N. Shayesteh Moghadam, J. M. Knight, Q. L. He, H. Liu, J. Wang, R. Lortz, I. K. Sou, and A. Gurevich, Phys. Rev. B 92, 094502 (2015).
8. *Pinning mechanism in electron-doped HTS NdCe0CuO epitaxial films*, A Guarino, A Leo, G Grimaldi, N. Martucciello, C. Dean, M. N. Kunchur, S. Pace, and A Nigro, Supercond. Sci. Technol. 27, 124011 (2014).
9. *The mixed state in the confined geometry of parallel fields in thin films*, M. N. Kunchur, M. Liang, C. Dean, A. Gurevich, refereed book chapter in "Electron Correlation in Nanostructures"; Springer-Verlag, NATO Science Series; J. Bonca and S. Kruchinin (Eds.); 1st Edition (2014).
10. *Depairing current density of Nd2-xCexCuO4-d superconducting films*, M. N. Kunchur, C. Dean, M. Liang, N. S. Moghaddam, A. Guarino, A. Nigro,G. Grimaldi, A. Leo, Physica C 495, 66 (2013).
11. *Depairing current density of infinite-layer Sr1-xLaxCuO2 superconducting films*, M. Liang, M. N. Kunchur, L. Fruchter, Z.Z. Li, Physica C 492, 178 (2013).
12. *The Vortex Explosion Transition,* M. N. Kunchur, M. Liang, and A. Gurevich, AIP Conf. Proc. 1512, 19 (2013).
13. *Thermally activated dynamics of spontaneous perpendicular vortices tuned by parallel magnetic fields in thin superconducting films,* M. N. Kunchur, M. Liang, and A. Gurevich, Phys. Rev. B 86, 024521 (2012).
14. *Non-Linear and Unstable Flux Vortex Dynamics,* M. N. Kunchur, M. Liang, J. Hua, and Z. Xiao, AIP Conf. Proc. 1349, 911 (2011).
15. *Transient response of a superconductor in an applied electric field,* M. N. Kunchur and G. F. Saracila, Ch. no. 10, pg. 129 in "Physical Properties of Nanosystems", NATO Science for Peace and Security Series B: Physics and Biophysics; Bonca, Janez; Kruchinin, Sergei (Eds.); 1st Edition, 2011, IX, 350 p., Hardcover; ISBN: 978-94-007-0043-7
16. *Vortex instability in molybdenum-germanium superconducting films*, M. Liang and M. N. Kunchur, Phys. Rev. B 82, 144517 (2010).
17. *Evaluating free flux flow in low-pinning molybdenum-germanium superconducting films*, M. Liang, M. N. Kunchur, J. Hua and Z. Xiao, Phys. Rev. B 82, 064502 (2010).
18. *Ballistic acceleration of a supercurrent in a superconductor*, G. F. Saracila and M. N. Kunchur, Phys. Rev. Lett. 102, 077001 (Feb. 20, 2009).
19. *Time evolution of a supercurrent during an applied voltage*, M. N. Kunchur and G. F. Saracila, Proceedings of the 53rd DAE Solid State Physics Symposium, vol. 53, pg. 907 (2008).
20. *Probing the temporal resolution and bandwidth of human hearing*, M. N. Kunchur, Proc. of Meetings on Acoustics (POMA) 2, 050006 (2008).
21. *Temporal resolution of hearing probed by bandwidth restriction*, M. N. Kunchur, Acta Acustica united with Acustica vol.

94, pgs. 594–603 (2008).

22. *High-field flux dynamics in disordered two-band superconductivity,* J. M. Knight and M. N. Kunchur, chapter no. 7, pg. 71 in "Electron Transport in Nanosystems", Eds. J. Bonca and S. Kruchinin, Springer Publishers, Dordrecht, The Netherlands (2008).
23. *Flux flow in a two-band superconductor with delocalized electric fields,* J. M. Knight and M. N. Kunchur, Phys. Rev. B 77, 024516 (2008).
24. *Audibility of temporal smearing and time misalignment of acoustic signals,* M. N. Kunchur, Technical Acoustics, 17 (2007).
25. *Hybrid type I—type II superconducting behavior in magnesium diboride,* M. N. Kunchur, G. Saracila, D. A. Arcos, Y. Cui, A. Pogrebnyakov, P. Orgiani, and X. X. Xi, Proceedings of the 51st DAE Solid State Physics Symposium, Bhopal, India, December 2006.
26. *Energy relaxation at a hot-electron vortex instability,* J.M. Knight and M. N. Kunchur, Phys. Rev. B 74, 64512 (2006).
27. *Anomalous flux dynamics in magnesium diboride films,* M. N. Kunchur, G. Saracila, D. A. Arcos, Y. Cui, A. Pogrebnyakov, P. Orgiani, X. X. Xi, P. W. Adams, and D. P. Young, Physica C 437-438, 171-175 (2006).
28. *Dissipation and destruction of superconductivity in magnesium diboride films,* M. N. Kunchur, Proceedings of the Joint Meeting of FIMS/ITS-NS/CTC/PLASMA-2004 and the Nanoscience and Engineering in Superconductivity conference, November 2004.
29. *Suppressed flux motion in magnesium diboride films*, D. H. Arcos and M. N. Kunchur, Phys. Rev. B 71, 184516 (2005).
30. *Current induced pair breaking in MgB_2* , M. N. Kunchur, Topical Review in J. Phys.: Cond. Matter 16, R1183-R1204 (2004).
31. *Mixed-state transport characteristics of magnesium diboride films*, M. N. Kunchur, C. Wu, D. H. Arcos, G. Saracila, Eun-Mi Choi, Kijoon H.P. Kim, W. N. Kang, and Sung-Ik Lee, Braz. J. Phys. 33, 705 (2003).
32. *Critical flux pinning and enhanced upper-critical-field in magnesium diboride films,* M. N. Kunchur, C. Wu, D. H. Arcos, B. I. Ivlev, Eun-Mi Choi, Kijoon H.P. Kim, W. N. Kang, and Sung-Ik Lee, Phys. Rev. B 68, 100503 (2003).
33. *The pair-breaking critical current density of magnesium diboride,* M. N. Kunchur, Sung-Ik Lee, and W. N. Kang, Phys. Rev. B. 68, 064516 (2003) .
34. *Hot-electron instability in superconductors*, M. N. Kunchur and J. M. Knight, Mod. Phys. Lett. B 17, 549 (2003).
35. *Unstable flux flow due to heated electrons in superconducting films*, M. N. Kunchur, Phys. Rev. Lett. 89, 137005 (2002).
36. *Shear fragmentation of unstable flux flow*, M. N. Kunchur, B.I. Ivlev, and J. M. Knight, Phys. Rev. B 66, 060505 (2002).
37. *Steps in the negative-differential-conductivity regime of a superconductor*, M. N. Kunchur, B.I. Ivlev, and J. M. Knight, Phys. Rev. Lett. 87, 177001 (2001).
38. *van Hove singularities and vortex motion in superconductors*, B.I. Ivlev, M. N. Kunchur and S. Mejia Rosales, Phys. Rev. B, 64, 024508 (2001).
39. *Metallic normal state of $YBa_2Cu_3O_{7-\delta}$,* M. N. Kunchur, B. I. Ivlev, D. K. Christen, and J. M. Phillips, Phys. Rev. Lett. 84, 5204 (2000).
40. *Vortex Instability and the Normal State at Low Temperatures,* M. N. Kunchur, B. I. Ivlev, D. K. Christen, and J. M. Phillips, Physica C, 341--348, 1003 (2000).
41. *Cherenkov resonances in vortex dissipation in superconductors",* B. I. Ivlev, S. Mejia Rosales, and M. N. Kunchur, Phys. Rev. B. 60, 12419 (1999).
42. *High-frequency Effects in Superconductors from Short-Duration DC pulses"*, M. N. Kunchur, D. K. Christen and J. M. Phillips, pg. 180, chapter in *Advances in Superconductivity and its Applications to Microwaves,* Eds. G. P. Srivasatava and R. P. Tandon, Allied Publishers Ltd., New Delhi (1998) [ISBN 81-7023-848-X].
43. *Hysteretic Internal Fields and Critical Currents in Polycrystalline Superconductors"*, M. N. Kunchur and T. R. Askew, J. Appl. Phys. 84, 6763 (1998).
44. *Decomposition of the Hall effect in the mixed state of superconductors"*, M. N. Kunchur, D. K. Christen, and B. I. Ivlev, Physica C 307, 241 (1998).
45. *Transport Behavior in Superconductors at Extreme Dissipative Levels"*, M. N. Kunchur, D. K. Christen, and B. I. Ivlev, pg. 135, chapter in *Advances in Superconductivity, New Materials, Critical Currents, and Devices,* Eds. R. Pinto, S. K. Malik, A. K. Grover, P. Ayyub, New Age International (P) Limited Publishers, New Delhi (1997) [ISBN 81-224-1125-8].
46. *Novel transport behavior found in the dissipative regime of superconductors*, M. N. Kunchur, Mod. Phys. Lett. B. 9, 399 (1995) [review article].
47. *Exploring the dissipative regime of superconductors for practical current-lead applications*, M. N. Kunchur, D. K. Christen, C. E. Klabunde, and K. Salama, Appl. Phys. Lett. 67, 848 (1995).
48. *Processing and Properties of High-J_c Grain Boundaries in Melt Textured $YBa_2Cu_3O_x$*, K. Salama, A. S. Parikh, M. N. Kunchur, and D. K. Christen, pg.58 in "Proceedings of International Cryogenic Materials Conference, Critical State in Superconductors", ed. by K. Tachikawa, K. Kitazawa, H. Maeda, T. Matsushita, World Scientific Publications, Singapore (1995).

49. *Hall effect in $YBa_2Cu_3O_{7-\delta}$ in the limit of free flux flow*, M. N. Kunchur, D. K. Christen, C. E. Klabunde, and J. M. Phillips, Phys. Rev. Lett. 72, 2259 (1994).
50. *Pair-breaking effect of high current densities on the superconducting transition on $YBa_2Cu_3O_7$*, M. N. Kunchur, D. K. Christen, C. E. Klabunde, and J. M. Phillips, Phys. Rev. Lett. 72, 752 (1994).
51. *Observation of free flux flow at high dissipation levels in $YBa_2Cu_3O_7$ epitaxial films*, M. N. Kunchur, D. K. Christen, and J. M. Phillips, Phys. Rev. Lett. 70, 998 (1993).
52. *Critical fields and critical currents of superconducting discs in transverse magnetic fields*, M. N. Kunchur and S. J. Poon, Phys. Rev. B 43, 2916 (1991).
53. *Superposition of decaying flux distributions: A memory effect from flux creep*, M. N. Kunchur, S. J. Poon, and M. A. Subramanian, Phys. Rev. B 41, 4089 (1990).
54. *Anomalous oxygen isotope effect in $La_{2-x}Sr_xCuO_4$*, M. K. Crawford, M. N. Kunchur, W.E.Farneth, E.M.McCarron, and S.J.Poon, Phys. Rev. B 41, 282 (1990).
55. *Flux creep and critical-current anisotropy in $Bi_2Sr_2CaCu_2O_{8+\square}$*, B.D.Biggs, M. N. Kunchur, J. J. Lin, S.J.Poon, T.R.Askew, R.B.Flippen, M.A.Subramanian, J.Gopalakrishnan, and A.W.Sleight, Phys. Rev. B 39, 7309 (1989).
56. *Magnetoresistance of amorphous Mo_xGe_{1-x} near the metal-insulator transition*, S.Yoshuzumi, T. H. Geballe, M. Kunchur, and W. L. McLean, Phys. Rev. B 37, 7094 (1988).
57. *Local magnetic field distribution in polycrystalline $YBa_2Cu_3O_{7-\delta}$ and its influence on bulk critical currents*, Thomas R. Askew, Richard B. Flippen, Kevin J. Leary, and M. N. Kunchur, J. Mat. Res. 6, 1135 (1991).
58. *Substitution and defect chemistry in superconducting (La,Sr)-Cu-O*, P. L. Gai, M. N. Kunchur, and E. M. McCarron. Electron Microscopy and Analysis 1991. Proceedings of the Institute Physics Electron Microscopy and Analysis Group Conference. Ed. F. J. Humphreys, IOP, Bristol, UK, pgs. 303--306 (1991).
59. *Substitution and defect chemistry of LaCuO systems*, P. L. Gai, M. N. Kunchur, and E. M. McCarron, 1990 Boston MRS Symp. K, MRS Symp. Proc. 209, 883--888 (1991).
60. *^{18}O isotope effect on T_c in $La_{2-x}Sr_xCuO_4$ as a function of x*, M.K.Crawford, M. N. Kunchur, W. E. Farneth, E. M. McCarron, and S. J. Poon, Physica C 162--164, 755 (1989).
61. *Superconductivity at the metal-insulator transition: Tuning with spin-orbit scattering*, T. A. Miller, M. Kunchur, Y. Z. Zhang, P. Lindenfeld, W. L. McLean, Phys. Rev. Lett. 61, 2717 (1988).
62. *Superconducting coherence in bulk granular metals*, W.L.McLean, M. Kunchur, P.Lindenfeld, and Y.Z.Zhang, Physica B 152, 232 (1988).
63. *Absence of superconductivity in metallic granular aluminum*, M. Kunchur, P. Lindenfeld, W. L. McLean, and J. S. Brooks, Phys. Rev. Lett. 59, 1232 (1987).
64. *Comparison of localization effects in granular magnesium and granularaluminum. Superlocalization?*, M.Kunchur, P.Lindenfeld, and W.L.McLean, in "Anderson Localization", Eds. T.Ando and H.Fukuyama, Springer Verlag, Berlin 1988, Proc. Int. Symp., Tokyo, Aug. 1987, pg. 190.
65. *Monotonic increase of magnetoresistance in amorphous Mo_xGe_{1-x} through the metal-insulator transition*, S.Yoshuzumi, T.H.Geballe, M. Kunchur, and W. L. McLean, in "Anderson Localization", Eds. T.Ando and H.Fukuyama, Springer Verlag, Berlin 1988, Proc. Int. Symp., Tokyo, Aug. 1987, pg. 67.
66. *The variation of T_c with resistivity and the disappearance of global superconductivity near the metal-insulator transition*, Y.Z.Zhang, M. Kunchur, T. Tsuboi, P. Lindenfeld, and W.L.McLean, Jap. J. Appl. Phys. 26, Supplement 26-3, 1311 (1987).
67. *Superconductivity near the metal-insulator transition*, T.A.Miller, M. Kunchur, Y.Z.Zhang, P.Lindenfeld, and W.L.McLean, Physica B 148 , 510 (1987).
68. *Quasireentrant superconductivity near the metal-insulator transition of granular aluminum*, M. Kunchur, Y. Z. Zhang, P.Lindenfeld, W.L.McLean, and J.S.Brooks, Phys. Rev. B 36, 4062 (1987).