

Ankit Kumar

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Research

- ▶ Transport properties of Topological materials using **Density Matrix theory**.
- ▶ Many-body physics using time-dependent **many-body perturbation theory**, non-equilibrium Green's functions, Kadanoff-Baym equations, and Dynamical Mean Field Theory
- ▶ Study of **light-matter interaction** in low dimensional systems.
- ▶ Band structure calculations using **Density Functional Theory**.

Employment History

- 2020 – ▶ **Postdoctoral Researcher** Department of Physics, UNSW, Sydney, NSW.
- 2018 – 2020 ▶ **Research Assistant** Department of Physics, NCSU, Raleigh, NC.
- 2017 – 2018 ▶ **Course Teaching Assistant** Department of Physics, NCSU, Raleigh, NC.
- 2016 – 2017 ▶ **Research Assistant** Department of Physics, NCSU, Raleigh, NC.
- 2015 – 2016 ▶ **Undergrad Lead Lab Instructor** Department of Physics, NCSU, Raleigh, NC.
- 2014 – 2015 ▶ **Undergrad Lab Instructor** Department of Physics, NCSU, Raleigh, NC.
- 2013 – 2014 ▶ **Undergrad Lab Instructor** Department of Physics, IISER, Mohali, India.

Education

- 2014 – 2020 ▶ **PhD, North Carolina State University, Raleigh NC, USA.**
Thesis title: *Dynamics of Correlated Electrons in Non-equilibrium Superconductors*
Supervisor: *Professor Alexander F. Kemper*
- 2008 – 2013 ▶ **BS-MS, Five years Interdisciplinary Course in Physics, Indian Institute Of Science Education and Research, Mohali India.** Specialization in nonlinear dynamics, network of coupled complex dynamical systems.
Thesis title: *Complex Dynamical Networks.*
Supervisor: *Professor Sudeshna Sinha*

Skills

- Programming Languages ▶ C++, C - Advanced user (parallelization using OpenMP, OpenMPI), Massive parallel computation on cluster SLURM, Quantum Espresso, Python, Julia (threaded and distributed parallelization), Matlab, Mathematica, SHELL, AWK, LUA SCRIPTING, L^AT_EX, Vim, Emacs.
- Data Analysis ▶ SAS, Python - Pandas, Numpy.
- Machine Learning ▶ Supervised and unsupervised machine learning in condensed matter systems.
- Admin ▶ ARCH-LINUX, NETWORK PROTOCOLS, Apache Web Server, DokuWiki, Wordpress.
- Spoken Languages ▶ English (Second language), Hindi (Mother tongue).

Research Publications

In preparation

- 1 Kumar, A. & Kemper, A. F. (2020). *Higgs mode and tr-arpes in non-equilibrium superconductors with a moving condensate.*
- 2 Kumar, A., Loughlin, M. & Kemper, A. F. (2020). *High harmonic generation in superconductors.*

Under Review

- 1 Dan, N., Alex, B., **Kumar, A.**, Samanvitha, S., Jordan, F., Shaun, O., ... Daniel, B. D. (2018). *Ultrafast thermalization and decay in the upper hubbard band of α -rucl₃.*

Journal Articles

- 1 Sun, R., Yang, S., Yang, X., **Kumar, A.**, Vetter, E., Xue, W., ... Cheng, Z.-h. (2020). Visualizing tailored spin phenomena in a reduced-dimensional topological superlattice. *Advanced Materials*, 32(49), 2005315. doi:<https://doi.org/10.1002/adma.202005315>
- 2 **Kumar, A.** & Kemper, A. F. (2019). Higgs oscillations in time-resolved optical conductivity. *Physical Review B*, 100(17), 174515. doi:10.1103/PhysRevB.100.174515
- 3 Revelle, J. P., **Kumar, A.** & Kemper, A. F. (2019). Theory of Time-Resolved Optical Conductivity of Superconductors: Comparing Two Methods for Its Evaluation. *Condensed Matter*, 4(3), 79. doi:10.3390/condmat4030079
- 4 **Kumar, A.**, Johnston, S. & Kemper, A. F. (2019). Identifying a forward-scattering superconductor through pump-probe spectroscopy. *EPL (Europhysics Letters)*, 124(6), 67002. doi:10.1209/0295-5075/124/67002
- 5 **Kumar, A.**, Agrawal, V. & Sinha, S. (2015). Spatiotemporal regularity in networks with stochastically varying links. *The European Physical Journal B*, 88(6), 138. doi:10.1140/epjb/e2015-50338-9

Other

- 1 **Kumar, A.** (2013). Effects of Nonlinear Coupling on Spatiotemporal Regularity. (p. 14).  <http://arxiv.org/abs/1309.4555>

Conferences and Schools

- 2020 ▶ **Contributed talk** APS March Meeting 2020*, Denver, Colorado, USA.
- 2019 ▶ **Contributed talk** Annual Meeting of the APS Southeastern Section 2019, Wrightsville Beach, NC, USA.
 - ▶ **Contributed talk** APS March Meeting 2019, Boston, MA, USA.
- 2018 ▶ **Poster presentation** Gordon Research Conference on Ultrafast Phenomena in Cooperative Systems, Galveston, TX, USA.
 - ▶ **Contributed talk** 2nd Future of Materials Workshop, Raleigh, NC, USA.
- 2017 ▶ **Contributed talk** 84th Annual Meeting of the APS Southeastern Section 2017, Milledgeville, GA, USA.
- 2016 ▶ **Poster presentation** MRS/ASM/AVS Meeting, Raleigh, NC, USA.
- 2014 ▶ **Participated** Bangalore School on Statistical Physics, RRI, Bangalore, India.
 - ▶ **Poster presentation** Accepted, XXXIII Dynamics Days 2014, Georgia, USA.

Conferences and Schools (continued)

- 2013 ▶ **Poster presentation** CNSD, International Conference on Nonlinear sciences, Indore, India.
- 2011 ▶ **Participated** Indian Conference on Cosmology and Galaxy formation, IISER Mohali, INDIA.
- 2010 ▶ **Participated** School in Radio Astronomy, NCRA Pune, India.
▶ **Participated** International Conference on NMR at the Interface of Physics, Chemistry and Biology, IISER Mohali, INDIA.

Awards and Achievements

- 2020 ▶ **Travel Award** DCMP division, APS March Meeting 2020*, Denver, Colorado, USA.
- 2019 ▶ **Travel Award** GERA at APS March Meeting 2019, Boston, MA, USA.
- 2018 ▶ **Travel Award** Gordon Research Conference on Ultrafast Phenomena in Cooperative Systems, Galveston, TX, USA.
- 2016 ▶ **Teaching Award** Graduate Teaching Award, NCSU, Raleigh, NC, USA.
- 2013-2014 ▶ **Research Fund** Indian Government - CSIR Junior Research Fellowship.
- 2013 ▶ **National-level Competition** GATE (rank 107), NET (rank 159), JEST (rank 46).
- 2008-2013 ▶ **Research Fund** Indian Government - INSPIRE Fellowship.
▶ **Research Fund** Indian Government - KVPY Fellowship.
- 2011 ▶ **Research Fund** India Academy of Science - Summer Research Fellowship.
- 2009 ▶ **Physics Olympiad** 2nd Stage State Level
- 2008 ▶ **National-level Competition** IIT-JEE, AIEEE.

Miscellaneous Experience

Teaching and Mentoring

- 2018 ▶ **Mentoring** I have been mentoring two undergrad students working on transient-optical response of superconductors and higher-order harmonics generation in solids.
▶ **Teaching** I have worked as a substitute teacher for Prof. Lex Kemper and taught a few lectures to undergrads.
▶ **Teaching** I have worked as a teaching assistant for graduate course QFT I, II.
- 2016 ▶ **Teaching** I have worked as the lead lab instructor for physics labs for undergrads and engineers.
- 2015 ▶ **Teaching** I have worked as a lab instructor for physics labs for undergrads and engineers.

Outreach

- 2018 ▶ **Physics Demonstrations for High School Students** Raleigh Charter School, Raleigh, NC.

Services

- 2015-2018 ▶ Member of Food Bank, Raleigh, NC.
- 2009-2012 ▶ Member & Co-founder, DRAMA club at IISER Mohali.

Miscellaneous Experience (continued)

- ▶ Member & Co-founder, YATN (Youths Attempt To Nurture) at IISER Mohali: To teach underprivileged kids.

Other

- 2016-..... ▶ Active member of badminton and running groups at NCSU.
- 2012-2013 ▶ **Table tennis** Bronze medal two times at IISER Mohali annual sports event.
- ▶ **Chess, Badminton** Gold and Silver medal at IISER Mohali annual sports event.

References

Dr. Alexander F. Kemper

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Department of Physics,
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Dr. Lubos Mitas

Distinguished University Professor
Department of Physics,
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Dr. Daniel Dougherty

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