

# Ankit Kumar

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## Research

- ▶ Many body physics using time-dependent many-body perturbation theory, non-equilibrium Green's functions and Kadanoff-Baym equations.
- ▶ Theoretical analysis of time- and momentum-resolved pump-probe spectroscopy.
- ▶ Study of light-matter interaction in low dimensional systems.
- ▶ Dynamical mean field theory.
- ▶ Band structure calculation using Density Functional Theory.

## Employment History

- 2018 – . . . . . ▶ **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 – Oct 2019 ▶ **PhD, North Carolina State University, Raleigh NC, USA.**  
Thesis title: *Dynamics of Correlated Electrons out of Equilibrium*  
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 non-linear 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, Matlab, Octave, Mathematica, LabView - Programming and Data acquisition, Markdown, SHELL, AWK, LUA SCRIPTING, L<sup>A</sup>T<sub>E</sub>X, 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, Dok-uWiki, Wordpress.
- Spoken Languages ▶ English (Second language), Hindi (Mother tongue).


## Research Publications

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### In preparation

- 1 Kumar, A. & Kemper, A. F. (2019b). *Higgs mode in the presence of supercurrent*.
- 2 Kumar, A. & Kemper, A. F. (2019c). *Transient optical conductivity of metals*.

### Under Review

- 1 Kumar, A. & Kemper, A. F. (2019a). *Higgs Oscillations in time-resolved Optical Conductivity*. arXiv: 1902.09549. February 27, 2019,  <http://arxiv.org/abs/1902.09549>
- 2 Revelle P., J., Kumar, A. & Kemper, A. F. (2019). *Theory of time-resolved optical conductivity of superconductors: Comparing two methods for its evaluation*.
- 3 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  $\alpha$ - $\text{RuCl}_3$* .

### Journal Articles

- 1 **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
- 2 **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

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- 2019 ► **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** 2<sup>nd</sup> Future of Materials Workshop, Raleigh, NC, USA.
- 2017 ► **Contributed talk** 84<sup>th</sup> Annual Meeting of the APS Southeastern Section, 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.
- 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.

## Conferences and Schools (continued)

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### Awards and Achievements

- 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** 2<sup>nd</sup> Stage State Level
- 2008 ► **National-level Competition** IIT-JEE, AIEEE.

## Miscellaneous Experience

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### 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.
- 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.
- **Badminton** Gold and Silver medal at IISER Mohali annual sports event.
- 2012 ► **Chess** Gold medal at IISER Mohali annual sports event.

## References

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**Dr. Alexander F. Kemper**

Assistant Professor

Department of Physics,  
NCSU, Raleigh NC, USA,

✉ [akemper@ncsu.edu](mailto:akemper@ncsu.edu)

**Dr. Lubos Mitas**

Distinguished University Professor

Department of Physics,  
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**Dr. Daniel Dougherty**

Associate Professor

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