SAURABH MAITI

Curriculum Vitae

Contact Information

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Education

- ***PhD**, Physics - 2013*
  University of Wisconsin-Madison, USA
  Thesis: Superconductivity in Iron-based superconductors
  Advisor: Prof. Andrey V. Chubukov, Department of Physics.
- ***B.Tech**(Bachelor of Technology) with honors, Electronics and Electrical Communication Engineering - 2007*
  Indian Institute of Technology, Kharagpur, India

Research Interests

Spin-orbit coupled systems
Collective phenomenon in correlated matter
Unconventional superconductivity
Engineered 2D systems

Grants and funds

- MITACS Business Strategy Internship with Nanoacademic Technologies Inc. C$15K (2023).
- Horizon Award for hosting Postdoctoral Scholar C$67K (2021-2023).
- QSciTech (CREATE) for PhD student C$25K(2020-2023)
- NSERC Discovery at C$24K/year (2019-2024)+C$24K for 2025.
- NSERC Discovery Launch Supplement C$12.5K (2019-2024).
- Concordia Early Career Researcher C$6K (2020).

- Concordia University startup C$85K (2019-2021).
- Center for Nanophase Materials Sciences, Oak Ridge National Lab. (operational use grant, 2016).
- Dirac Fellowship US$120K (2013-2015).

Scholarships and awards through students

- Rami Zemouri, FRQNT Scholarship, C$17.5K/yr, 2023-2024.
- Dean Fountas, NSERC USRA, 2023
- Rami Zemouri CUSRA, 2023
- Giordano Gaudio, CUSRA, 2022
- Colton Lelievre, NSERC USRA, 2021

HQP Supervision

- Surajit Sarkar, Horizon PostDoc, 2022-2024
- Rami Zemouri, PhD student, 2023-present
- Rami Zemouri, BSc Honors and CUSRA, 2023
- Mojdeh Saleh, PhD student, 2022-present
- Giordano Gaudio, CUSRA, Summer 2022
- Joshua Emmerson, BSc specialization, Summer 2021
- Jonathan Discenza, BSc Honors, 2022
- Colton Lelievre, BSc Honors and NSERC USRA, 2022
- Jun Hyung Bae, PhD student, 2021-present
- Igor Benek Lins, PhD student, 2020-present
- Jun Hyung Bae, MSc student, 2019-2020
- Igor Benek Lins, MSc student, 2019-2020
- Jeremie Mede-Mousa, BSc Honors, 2020

Experience

- Assistant Professor, **Concordia University, Montreal, Canada**. [2019-present].
- Postdoctoral Fellow, **University of Massachusetts, Amherst, USA**.[2017-2019].
- Postdoctoral Scholar, **University of Florida, Gainesville, USA**.[2015-2017].
- Dirac Fellow, **National High Magnetic Field Laboratory/University of Florida**.[2013-2015]
- Visiting Scientist, **Ruhr-University, Bochum, Germany**, with **Prof. Ilya Eremin**. [2010]
- Visiting Scientist, **MPI-PKS, Dresden, Germany**. [2010]
- Research and Teaching Assistant, **University of Wisconsin, Madison, USA**, with **Prof. Andrey V. Chubukov**. [2007 – 2013]
- Summer Intern at **Texas Instruments, India**. [2006]
- Summer Research Fellow, Dept. of Astronomy and Astrophysics, **Raman Research Institute, India.** [2005]

Invited Talks

- University of Florida, Apr, 2024
- Northwest Missouri State University, Apr, 2024
- American Physical Society, *in an invited session*, Minneapolis, Mar, 2024
- CERMM, Concordia, Montreal, Oct, 2023
- University of Florida, Gainesville, Jul, 2023
- CAP Congress, Fredericton, Jun, 2023.
- Indian Institute of Science, India, May, 2023.
- Indian Institute for Science Education and Research, India, May, 2023.
- (declined) Indian Institute of Technology, Hyderabad, May, 2023
- APS meeting invited talk, Remote, Mar, 2021.
- University of Alberta, Feb, 2021.
- University of Washington, Nov, 2020.
- University of Florida, Gainesville, Aug, 2020.
- [cancelled due to covid-19] CAP Meeting, Jun, 2020.
- [cancelled due to covid-19] APS meeting invited session, Denver, Mar, 2020.

- Dawson College, Experiential learning lecture, Feb, 2020
- University de Sherbrooke, Jan, 2020.
- McGill University, Montreal, Oct, 2019.
- University de Montreal, Sept, 2019.
- Concordia University, Montreal, 2019.
- University of Massachusetts, Amherst, May, 2019.
- Concordia University, Montreal, Canada, March, 2018.
- University of Missouri, CO, Feb, 2018.
- University of Massachusetts, Amherst, Mar, 2017.
- University of Minnesota, Minneapolis, Dec, 2016.
- Quantum Criticality and Topology in Itinerant Systems, Aug, 2016.
- APS meeting invited session, Baltimore, March, 2016.
- Argonne National Laboratory, Jan, 2015.
- APS meeting invited session, Denver, March, 2014.
- Los Alamos National Laboratory - Jan, 2014.
- National High Magnetic Field Laboratory - Sept, 2013.
- Tata Institute of Fundamental Research, India - Sept, 2012.
- Energy Materials and Nanotechnology Meeting (workshop on Fe-based superconductors)- April, 2012.
- Rutgers University - Dec, 2011.

Referee Activities

- National Science Foundation - Grants
- Nature Physics
- Nature Materials
- Physical Review Letters
- Physical Review X
- Communications Physics
- Annals of Physics
- Physical Review B

- EuroPhysics Letters
- New Journal of Physics
- npj Quantum Materials
- Physical Review Research
- Applied Physics Letters
- Journal of Physics A: Mathematical and Theoretical
- Journal of Physics D: Applied Physics
- Journal of Physics Condensed Matter
- Frontiers in Physics
- Physica Status Solidi b

Other honors

- Hallet H. and Mary F. Germond Award for excellence in graduate research from University of Wisconsin, Madison [2012].
- Van Vleck Fellowship Award from University of Wisconsin, Madison [2012].
- FGSA Travel Award for Excellence in Graduate Research from American Physical Society. [2012]
- Vilas Travel Award, University of Wisconsin, Madison. [2011]
- Awarded 'Honored Instructor' by Chadbourne Residential College, UW-Madison. [2008]
- Awarded Goralal Syngal Scholarship - IIT, Kharagpur, India [$2003 - 07$].

Workshops and related activities

- Intersection of AI and Quantum, Montreal, Jan, 2023.
- Quantum criticality and topology in correlated electron systems
  Talk: *Composite Fermion State in Graphene: A Haldane-Chern insulator?* [Aug, 2019]
- Workshop on precision many body physics
  Poster: *Bosons in a flat band: a fermionization approach* [Oct, 2018]
- Gordon Conference on Superconductivity
  Poster: *Conservation laws, vertex corrections, and screening in Raman spectroscopy* [June, 2017]

- Quantum Criticality and Topology in Itinerant Systems, Albuquerque, NM.
  Talk: *Collective excitations and instabilities in Spin Orbit coupled Fermi-Liquid.* [August, 2016]

- Bad Metals, Magnetism and beyond. Workshop at Kalvi Institute for Theoretical Physics, Santa Barbara.
  Poster: *Quantum critical points inside the superconducting dome in Fe-based superconductors* [September, 2014]

- Innovations in Strongly Correlated Electronic Systems: School and Workshop, Italy.
  Poster: *Nodes in the coexistence region in Fe-based superconductors* [August, 2012]

- Gordon Conference on Correlated Electron Systems
  Poster: *Nodes in the coexistence region in Fe-based superconductors* [June, 2012]

- Energy Materials and Nanotechnology Meeting (workshop on Fe-based superconductors)-Orlando, FL
  Talk: *Superconductivity in K doped* $BaFe_2As_2$ [April, 2012]

- Multiband and Multiorbital Effects in Novel Materials, France.
  Presented talk on *Relating* $2\Delta/T_c$ *on hole Fermi surface to nodes in Iron based Superconductors* [2011]

- Workshop on Unconventional Superconductivity. FTPI, Minneapolis.
  Presented poster titled *Evolution of superconductivity in Fe-based superconductors with doping* [2011]

- APS March Meeting, Dallas, TX.
  Presented *RG study of Iron based superconductors* [2011]

- Workshop on Emergent Quantum States in Complex Correlated Matter, MPI-PKS, Dresden, Germany.
  Presented poster titled *RG flow of Iron based superconductors* [2010]

- 4^{th} ICAM-FAPERJ Summer School on New Phenomenon in Quantum Matter, Rio de Janerio, Brazil.
  Presented poster titled *Optical Integral and Sum Rule violation in cuprates.* [2010]

- APS March Meeting, Portland, OR.
  Presented *Optical Integral and Sum Rule violation* [2010]

- Workshop on Cuprate Fermiology, University of Maryland. [2008]

- Workshop on Superconductivity and Superfluidity in Finite Systems, University of Wisconsin-Madison [2008]

- Indo-German Winter Academy at Jamshedpur organized by University of Erlangen-Nürnberg, Germany and TATA Steel Corporation, India.
  Presented talk on *SiC Devices.*[2005]

- National Initiative for Undergraduate Science (NIUS) camp organized by Tata Institute of Fundamental Research (TIFR) & Homi Bhabha Centre for Science Education (HBSCE), India. [2004]

Publications-Review/Books

- *Collective spin modes in Fermi liquids with spin-orbit coupling*, Dmitrii L. Maslov, Abhishek Kumar, Saurabh Maiti, invited review for Journal of Experimental and Theoretical Physics for the 95th birthday of Prof. Emmanuel I. Rashba, JETP 135, 549-574 (2022).
- *Superconductivity from repulsive interactions*, Saurabh Maiti and Andrey Chubukov, Chapter 15, Novel Superfluids, Vol. 2, ed. by Karl-Heinz Bennemann and John B. Ketterson, Oxford University Press(2015).

Journal Publications

1. *Electronic Raman response of a superconductor across a time reversal symmetry breaking phase transition*
   S. Sarkar*, **S. Maiti**, Phys. Rev. B **109**, 094515 (2024).
2. *Many-body physics-induced selection rules: application to Raman spectroscopy*
   I. Benek-Lins*, **S. Maiti**, Phys. Rev. B **109**, 104505 (2024).
3. *Spin-mediated direct photon scattering by plasmons in BiTeI*
   A. C. Lee, S. Sarkar*, K. Du, H. -H. Kung, C. J. Won, K. Wang, S. -W. Cheong, **S. Maiti**, G. Blumberg, Phys. Rev. B **109**, L041111 (2024).
   Editor's Suggestion
4. *Spin-orbit interaction enabled electronic Raman scattering from charge collective modes*
   S. Sarkar*, A. Lee, G. Blumberg, **S. Maiti**, Phys. Rev. B **109**, 035160 (2024).
   Editor's Suggestion
5. *Isolated flat bands in 2D lattices based on a novel path-exchange symmetry*
   J.-H. Bae*, T. Sedrakyan, **S. Maiti**, SciPost Phys. **15**, 139 (2023).
6. *Zero-field spin resonance in graphene with proximity-induced spin-orbit coupling*
   A. Kumar, **S. Maiti** and D. Maslov, Phys. Rev. B **104**, 155138 (2021).
7. *Nematicity and Superconductivity: Competition vs. Cooperation*
   X. Chen, S. Maiti, R.M. Fernandes, and P.J. Hirschfeld, Phys. Rev. B **102**, 184512 (2020).
8. *Composite fermion state of Graphene as a Haldane-Chern insulator*
   S. Maiti and T. Sedrakyan, Phys. Rev. B **100**, 125428 (2019).
9. *Fermionization of Bosons in a Flat Band*
   S. Maiti and T. Sedrakyan, Phys. Rev. B **99**, 174418 (2019).
10. *Microscopic origin of Cooper pairing in the iron-based superconductor* $Ba_{1-x}K_xFe_2As_2$
    T. Bohm, F. Kretzschmar, A. Baum, M. Rehm, D. Jost, R. H. Ahangharnejhad, R. Thomale, C. Platt, T. A. Maier, W. Hanke, B. Moritz, T. P. Devereaux, D. J. Scalapino, S. Maiti, P. J. Hirschfeld, P. Adelmann, T. Wolf, H.-H. Wen and R. Hackl, npj Quantum Materials **3**, 48 (2018).

11. *Chiral Spin Mode on the Surface of a Topological Insulator*
H.-H. Kung, S. Maiti, X. Wang, S.-W. Cheong, D. L. Maslov, G. Blumberg, Phys. Rev. Lett. **119**, 136802 (2017).
Media highlights with Altmeter attention score of 111 (top 5%).

12. *Conservation laws, vertex corrections, and screening in Raman spectroscopy*
Saurabh Maiti, Andrey V. Chubukov, P. J. Hirschfeld, Phys. Rev. B **96**, 014503 (2017).

13. *Raman Scattering by a Two Dimensional Fermi Liquid with Spin Orbit Coupling*
Saurabh Maiti, Dmitrii L. Maslov, Phys. Rev. B **95**, 134425 (2017).

14. *Probing the pairing symmetry and multiple Bardasis-Schrieffer modes using Raman Spectroscopy*
Saurabh Maiti, T. A. Maier, T. Böhm, R. Hackl, P. J. Hirschfeld, Phys. Rev. Lett. **117**, 257001 (2016).

15. *Distinguishing between $s+id$ and $s+is$ pairing symmetries in multiband superconductors through spontaneous magnetization pattern induced by a defect*
Shi-Zeng Lin, Saurabh Maiti, Andrey Chubukov, Phys. Rev. B, **94**, 064519 (2016).

16. *High T_c via Spin Fluctuations from Incipient Bands: Application to Monolayers and Intercalates of FeSe*
A. Linscheid, S. Maiti, Y. Wang, S. Johnston, and P. J. Hirschfeld, Phys. Rev. Lett. **117** 077003 (2016).

17. *Electron Spin Resonance in a 2D Fermi liquid with spin orbit coupling*,
Saurabh Maiti, Muhammad Imran, Dmitrii L. Maslov, Phys. Rev. B **93**, 045134 (2016).

18. *Energy Gap Evolution Across the Superconductivity Dome in Single Crystals of $Ba_{1-x}K_xFe_2As_2$*
Kyuil Cho, M. Konczykowski, S. Teknowijoyo, M. A. Tanatar, Y. Liu, T. A. Lograsso, W. E. Straszheim, V. Mishra, S. Maiti, P. J. Hirschfeld, R. Prozorov, Sci. Adv., e1600807 (2016).

19. *Effect of nonmagnetic impurities on $s\pm$ superconductivity in the presence of incipient band*
X. Chen, V. Mishra, S. Maiti, P. J. Hirschfeld, Phys. Rev. B. **94**, 054524(2016).

20. *Electron pairing in the presence of incipient bands in iron-based superconductors*
Xiao Chen, S. Maiti, A. Linscheid, P. J. Hirschfeld, Phys. Rev. B **92**, 224514 (2015).

21. *Collective modes in superconductors with competing s- and d-wave interactions*,
Saurabh Maiti and P. J. Hirschfeld, Phys. Rev. B **92**, 094506 (2015).

22. *Spontaneous currents in a superconductor with $s+is$ symmetry*,
Saurabh Maiti, Manfred Sigrist and Andrey Chubukov, Phys. Rev. B **91**, 161102(R) (2015).

23. *Intrinsic Damping of Collective Spin Modes in a Two-Dimensional Fermi Liquid with Spin-Orbit Coupling*,
Saurabh Maiti, and Dmitrii Maslov, Phys. Rev. Lett., **114**, 156803 (2015).

24. *Collective modes in two- and three-dimensional electron systems with Rashba spin-orbit coupling*,
Saurabh Maiti, Vladimir Zyuzin and Dmitrii Maslov, Phys. Rev. B, **91**, 035106 (2015).

25. *Tuning the Fermi level through the Dirac point of giant Rashba semiconductor BiTeI with pressure*,
D. VanGennep, S. Maiti, D. Graf, S. W. Tozer, C. Martin, H. Berger, D. L. Maslov, J. J. Hamlin, J. Phys. Condens. Matt. **26**, 342202 (2014).

26. *Superconductivity from repulsive interaction*,
Saurabh Maiti, Andrey V. Chubukov, published in "Proceedings of the XVII Training Course in the physics of Strongly Correlated Systems", Vietri sul Mare (Salerno), Italy. arXiv:1305.4609 (2013).

27. *How many quantum phase transitions exist inside the superconducting dome of the iron pnictides?* ,
R. M. Fernandes, S. Maiti, P. Wölfle, A. V. Chubukov, Phys. Rev. Lett. **111**, 057001 (2013).

28. *s+is State with Broken Time Reversal Symmetry in Fe-Based Superconductors*,
S. Maiti, A.V. Chubukov, Phys. Rev. B **87**, 144511 (2013).
Editor's Suggestion

29. *Electronic transport in the Coulomb phase of the pyrochlore spin ice*
G.-W. Chern, S. Maiti, R.M. Fernandes, P. Wölfle, Phys. Rev. Lett. **110**, 146602 (2013).

30. *Gap nodes in coexistence region in Fe-based superconductors*,
S. Maiti, R.M Fernandes, A.V. Chubukov Phys. Rev. B **85**, 144527 (2012).
Editor's Suggestion

31. *Gap symmetry in KFe_2As_2*,
S. Maiti, M.M. Korshunov, A.V. Chubukov, Phys. Rev. B **85**, 014511 (2012) .

32. *Evolution of symmetry and structure of the gap in Fe-based superconductors with doping and interactions*,
S. Maiti, M.M. Korshunov, T.A. Maier, P.J. Hirschfeld, A.V. Chubukov, Phys. Rev. B **84**, 224505 (2011).
Editor's Suggestion
Synopsis in Physics

33. *Effect of nodes, ellipticity, and impurities on the spin resonance in iron-based superconductors*,
S. Maiti, J. Knolle, I. Eremin, A.V. Chubukov, Phys. Rev. B **84**, 144524 (2011).
Editor's Suggestion

34. *Evolution of the Superconducting State of Fe-Based Compounds with Doping*,
S.Maiti, M.M. Korshunov, T.A. Maier, P.J. Hirschfeld, A.V. Chubukov, Phys. Rev. Lett. **107**, 147002 (2011).

35. *Effect of Fermi Surface Nesting on Resonant Spin Excitations in* $Ba_{1-x}K_xFe_2As_2$.
J.-P. Castellan, 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, Phys. Rev. Lett. **107**, 177003 (2011).

36. *Relation between nodes and* $2\Delta/T_c$ *on the hole Fermi surface in iron-based superconductors*,
Saurabh Maiti, Andrey Chubukov,Phys. Rev. B **83**, 220508 (2011).
Editor's Suggestion
Synopsis in Physics

37. *Renormalization group flow, competing phases, and the structure of superconducting gap in multiband models of iron-based superconductors*,
Saurabh Maiti, Andrey Chubukov, Phys. Rev. B **82**, 214515,(2010).
Editor's Suggestion

38. *Optical Integral and Sum Rule violation in High-*T_c *superconductors*,
Saurabh Maiti, Andrey Chubukov,Phys. Rev. B **81**, 245111,(2010).