

# 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  
Strong correlations in electronic systems  
Unconventional superconductivity  
Gauge fields in lattice systems

## Grants and Awards

- NSERC Discovery at C\$24K/year (2019-2024).
- NSERC Discovery Launch Supplement C\$12.5K (2019-2024).
- 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).

## 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 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.

### **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].

### **Referee Activities**

- National Science Foundation
- Nature Physics
- Physical Review Letters
- EuroPhysics Letters
- New Journal of Physics
- npj Quantum Materials
- Physical Review B
- Applied Physics Letters
- Journal of Physics A: Mathematical and Theoretical
- Journal of Physics D: Applied Physics

### **Student Supervision**

- Igor Benek Lins, MSc student, 2019-present
- Jun Hyung Bae, MSc student, 2019-present

### **Workshops and related activities**

- 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<sub>2</sub>As<sub>2</sub>* [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<sup>th</sup> ICAM-FAPERJ Summer School on New Phenomenon in Quantum Matter, Rio de Janeiro, 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]

### **Skills**

Softwares/Programming Language : Matlab, Mathematica, C  
Utility Softwares : Latex, Word, Excel, Powerpoint  
Operating System : Windows, Linux.  
Languages : English(fluent), Hindi(fluent), Bengali(native)

### **Extra-Academic Activities:**

- Treasurer, Indian Graduate Student Association, University of Wisconsin, Madison (2008,09).
- Chairman of the Awards Committee of Patel Hall of Residence, IIT Kharagpur (2007).

## Publications-Review/Books

- *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. *Is the composite fermion state in Graphene a doped Haldane's Chern insulator?*  
S. Maiti and T. Sedrakyan, arXiv:1812.10153(2019).
2. *Fermionization of Bosons in a Flat Band*  
S. Maiti and T. Sedrakyan, *Phys. Rev. B* **99**, 174418 (2019).
3. *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).
4. *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 Altmetric attention score of 111 (top 5%).
5. *Conservation laws, vertex corrections, and screening in Raman spectroscopy*  
Saurabh Maiti, Andrey V. Chubukov, P. J. Hirschfeld, *Phys. Rev. B* **96**, 014503 (2017).
6. *Raman Scattering by a Two Dimensional Fermi Liquid with Spin Orbit Coupling*  
Saurabh Maiti, Dmitrii L. Maslov, *Phys. Rev. B* **95**, 134425 (2017).
7. *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).
8. *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).
9. *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).
10. *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).
11. *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).

12. *Effect of nonmagnetic impurities on s superconductivity in the presence of incipient band*  
X. Chen, V. Mishra, S. Maiti, P. J. Hirschfeld, Phys. Rev. B. **94**, 054524(2016).
13. *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).
14. *Collective modes in superconductors with competing s- and d-wave interactions,*  
Saurabh Maiti and P. J. Hirschfeld, Phys. Rev. B **92**, 094506 (2015).
15. *Spontaneous currents in a superconductor with s + is symmetry,*  
Saurabh Maiti, Manfred Sgrist and Andrey Chubukov, Phys. Rev. B **91**, 161102(R)  
(2015).
16. *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).
17. *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).
18. *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).
19. *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).
20. *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).
21. *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
22. *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).
23. *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
24. *Gap symmetry in  $KFe_2As_2$ ,*  
S. Maiti, M.M. Korshunov, A.V. Chubukov, Phys. Rev. B **85**, 014511 (2012) .

25. *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
26. *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
27. *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).
28. *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).
29. *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
30. *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
31. *Optical Integral and Sum Rule violation in High- $T_c$  superconductors*,  
Saurabh Maiti, Andrey Chubukov, Phys. Rev. B **81**, 245111,(2010).