

Peayush Kumar Choubey

Curriculum Vitae

Dept. of Physics, IIT-Roorkee
Roorkee, Uttarakhand-247667, India.

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CURRENT POSITION

Assistant Professor, *Department of Physics*, Indian Institute of Technology-Roorkee.

EDUCATION

2017 **Ph.D. in Physics**, *University of Florida*, Gainesville, USA.

Adviser: Prof. Peter Hirschfeld

2008 **B.Tech. in Electronics Engineering**, *Indian School of Mines University*, Dhanbad (presently IIT(ISM)-Dhanbad).

RESEARCH INTERESTS

- Unconventional superconductivity
- Theory of scanning tunneling spectroscopy
- Two-dimensional materials and heterostructures
- Strongly correlated electron systems

EMPLOYMENT

2022–Present **Assistant Professor**, *Department of Physics*, Indian Institute of Technology-Roorkee, India.

2021–2022 **Assistant Professor**, *Department of Physics*, Indian Institute of Technology (Indian School of Mines)-Dhanbad, India.

2019–2021 **Research Assistant**, *Institute for Theoretical Physics III*, Ruhr-University Bochum, Germany.

2017–2018 **National Postdoctoral Fellow**, *Department of Physics*, Indian Institute of Science, Bangalore, India.

2017 **Postdoctoral Fellow**, *Department of Physics*, Indian Institute of Science, Bangalore, India.

2012–2017 **Graduate Research Assistant**, *Department of Physics*, University of Florida, Gainesville, Florida, USA.

2010–2016 **Graduate Teaching Assistant**, *Department of Physics*, University of Florida, Gainesville, Florida, USA.

2008–2010 **Scientist B**, *Centre for Airborne Systems*, Defence Research and Development Organization, Bangalore, India.

COURTESY APPOINTMENTS

2021–Present **Consultant Faculty**, *Department of Physics*, University of Florida, Gainesville, Florida, USA.

VISITING POSITIONS

2018 **Visiting Fellow**, *Laboratory of Atomic and Solid State Physics*, Cornell University, New York, USA.

2014 **Research Affiliate**, *Kavli Institute of Theoretical Physics*, Santa Barbara, California, USA.

2013 **Visiting Scientist**, *Institute for Theoretical Physics*, Goethe-University, Frankfurt, Germany.

2008 **Summer Intern**, *Harish Chandra Research Institute*, Allahabad, India.

2007 **Summer Intern**, *Solid State Physics Research Laboratory*, Defence Research and Development Organization, New Delhi, India.

SPONSORED PROJECTS

2017–2018 **Effects of disorder and magnetic field on the charge ordered states in cuprates**, *Science and Engineering Research Board (SERB), India*, Amount utilized: INR 889000.

AWARDS AND HONORS

2017 **National Postdoctoral Fellowship**, *Science & Engineering Research Board, India*. Two-year fellowship awarded to support a research proposal.

2017 **Dissertation Fellowship**, *College of Liberal Arts & Sciences, University of Florida*. Fellowship awarded to allow for focus on thesis composition.

2016 **E. Raymond Andrew Memorial Award**, *Department of Physics, University of Florida*.

Awarded annually to a senior graduate student in physics for distinction in research.

2011–2016 **Outstanding Achievement Award**, *University of Florida International Center*. Awarded annually for maintaining 4.0 GPA (on a scale of 4).

2010 **Alumni Fellowship**, *University of Florida*.

Four-year fellowship awarded for performance in undergraduate career.

2005–2008 **Merit-cum-Scholarship**, *Indian School of Mines University, Dhanbad*.

Fellowship awarded annually for academic excellence.

PROFESSIONAL MEMBERSHIPS

Early Career Member, *American Physical Society*.

Member, *German Physical Society*.

PUBLICATIONS

In peer-reviewed journals

- 2021 **Scattering interference signature of a pair density wave state in the cuprate pseudogap phase**, *S. Wang, Peayush Choubey, Y. X. Chong, W. Chen, W. Ren, H. Eisaki, S. Uchida, P.J. Hirschfeld and J.C. Séamus Davis*, Nature Communications, 12, 6087 (2021).
[Equal contributions by Peayush Choubey (theory), S. Wang and Y. X. Chong (experiment).]
- 2021 **Direct visualization of a static incommensurate antiferromagnetic order by suppressing the superconducting phase coherence in Fe-doped $\text{Bi}_2\text{Sr}_2\text{CaCuO}_{8+\delta}$** , *S. Wan, H. Li, Peayush Choubey, Q. Gu, H. Yang, I. Eremin, G. Gu and Hai-Hu Wen*, Proceedings of National Academy of Sciences of U.S.A. 118, e2115317118 (2021).
[Equal contributions by Peayush Choubey (theory), S. Wan and H. Li (experiment).]
- 2021 **Electronic theory for scanning tunneling microscopy spectra in infinite-layer nickelate superconductors**, *Peayush Choubey and Ilya Eremin*, Physical Review B 104, 144504 (2021).
- 2020 **Atomic-scale electronic structure of the cuprate pair density wave state coexisting with superconductivity**, *Peayush Choubey, S. H. Joo, K. Fujita, Zengyi Du, S. D. Edkins, M. H. Hamidian, H. Eisaki, S. Uchida, A. P. Mackenzie, J. Lee, J. C. Séamus Davis and P. J. Hirschfeld*, Proceedings of National Academy of Sciences of U.S.A. 117, 14805 (2020).
- 2017 **Universality of scanning tunneling microscopy in cuprate superconductors**, *Peayush Choubey, A. Kreisel, T. Berlijn, B. M. Andersen, and P. J. Hirschfeld*, Physical Review B 96, 174523 (2017).
- 2017 **Incommensurate charge ordered states in the $t - t' - J$ model**, *Peayush Choubey, Wei-Lin Tu, Ting-Kuo Lee, and P. J. Hirschfeld*, New Journal of Physics 19, 013028 (2017).
- 2015 **Interpretation of scanning tunneling quasiparticle interference and impurity states in cuprates**, *A. Kreisel, Peayush Choubey, T. Berlijn, W. Ku, B. M. Andersen and P. J. Hirschfeld*, Physical Review Letters 114, 217002 (2015).
[Equal contributions by Peayush Choubey and A. Kreisel; Featured on the cover of the journal.]
- 2014 **Visualization of atomic-scale phenomena in superconductors: application to FeSe**, *Peayush Choubey, T. Berlijn, A. Kreisel, C. Cao, and P. J. Hirschfeld*, Physical Review B 90, 134520 (2014).

In conference proceedings

- 2009 **Non-equilibrium spin current in a two terminal mesoscopic System**, *Peayush K. Choubey*, Proceedings of International Workshop on the Physics of Semiconductor Devices (IWPSD-2009), New Delhi, India, pp. 82-84.
- 2009 **Quantum effects on the electrostatics of nanoscale surround gate MOSFET**, *Peayush K. Choubey, Sajal K. Paul, and S. Dasgupta*, Proceedings of International Workshop on the Physics of Semiconductor Devices (IWPSD-2009), New Delhi, India, pp. 78-81.

Citation metrics

Total citations: 156, according to Google Scholar and **107**, according to Web of Science.

(retrieved on 14.01.2022)

Manuscripts under preparation

- 2022 **Impurity-induced bound states in Fe-based superconductors with spin-orbit coupling**, *Peayush Choubey and Ilya Eremin.*
- 2022 **Manifestations of short-range pair density wave in cuprates**, *Peayush Choubey, J.C. Séamus Davis, and P. J. Hirschfeld.*
- 2022 **Short-range antiferromagnetic order in Fe-doped $\text{Bi}_2\text{Sr}_2\text{CaCuO}_{8+\delta}$** , *Peayush Choubey, Hai-Hu Wen, and Ilya Eremin.*
- 2022 **Tunneling spectroscopy signatures of spin-triplet pairing in Ising superconductors**, *Peayush Choubey and Ilya Eremin.*
- 2022 **Charge density wave and superconductivity in infinite-layer nickelates**, *Peayush Choubey.*

CONTRIBUTED TALKS

- 2018 **Pair density Wave driven charge order in cuprates**, *Peayush Choubey and P. J. Hirschfeld*, American Physical Society March Meeting, Los Angeles, California, USA (2018).
- 2017 **Incommensurate charge ordered states in the $t - t' - J$ model**, *Peayush Choubey, Wei-Lin Tu, Ting-Kuo Lee, and P. J. Hirschfeld*, American Physical Society March Meeting, New Orleans, Louisiana, USA (2017).
- 2016 **Theoretical visualization of charge order in cuprates**, *Peayush Choubey, Wei-Lin Tu, Ting-Kuo Lee, and P. J. Hirschfeld*, American Physical Society March Meeting, Baltimore, Maryland, USA (2016).
- 2015 **Magnetic impurity induced states in $\text{Bi}_2\text{Sr}_2\text{CaCuO}_{8+\delta}$** , *Peayush Choubey, A. Kreisel, T. Berlijn, B. M. Andersen and P. J. Hirschfeld*, American Physical Society March Meeting, San Antonio, Texas, USA (2015).
- 2013 **Theoretical visualization of atomic-scale impurity states in Fe-based superconductors**, *Peayush Choubey, T. Berlijn, C. Cao, and P. J. Hirschfeld*, American Physical Society March Meeting, Baltimore, Maryland, USA (2013).

WORKSHOPS AND TRAINING

- 2019 **Quantum Materials Symposium**, University of Oxford, UK (2019).
Poster presented: Coexisting pair density wave and superconducting order in underdoped cuprates
- 2017 **Workshop on Correlation and Disorder in Classical and Quantum Systems**, International Center for Theoretical Sciences, Bangalore, India (2017).
- 2016 **Quantum criticality and topology in itinerant electron systems conference**, Albuquerque, New Mexico, USA (2016).
Poster presented: Incommensurate charge ordered states in the $t - t' - J$ model.

- 2014 **KITP conference on strong correlations and unconventional Superconductivity**, Santa Barbara, California, USA (2014).
Poster presented: Impurity induced states in superconducting $\text{Bi}_2\text{Sr}_2\text{CaCu}_{1-x}\text{Zn}_x\text{O}_{8+\delta}$.
- 2014 **Boulder school for condensed matter and materials physics**, *University of Colorado*, Boulder, Colorado, USA (2014).
Poster presented: Impurity induced states in superconducting BSCCO.
- 2013 **Cargèse summer school on superconductivity- theory, experiment and phenomena**, Cargèse, Corsica Island, France (2013).
Poster presented: Theoretical visualization of atomic scale impurity states in FeSe.

TEACHING

- Winter 2022, 2021 **Physics of semiconducting materials and devices**, *PhD course*, at IIT(ISM)-Dhanbad.
- Winter 2022 **Applied Optics Lab**, *UG course*, at IIT(ISM)-Dhanbad.
- Monsoon 2021 **Physics**, *B.Tech. common course*, at IIT(ISM)-Dhanbad.
- Monsoon 2021 **Theoretical Physics**, *PhD course*, at IIT(ISM)-Dhanbad.
- Monsoon 2021 **Waves and Acoustics Lab**, *UG course*, at IIT(ISM)-Dhanbad.
- Summer 2020 **Physics of complex phase transitions in solids**, *PG course (Exercise)*, at Ruhr-University Bochum.
- Winter 2019 **Introduction to theoretical solid state physics**, *UG course (Exercise)*, at Ruhr-University Bochum.
- Summer 2019 **Advanced solid state theory**, *PG course (Exercise)*, at Ruhr-University Bochum.
- Summer 2019 **Introduction to quantum mechanics**, *UG course (Exercise)*, at Ruhr-University Bochum.
- 2015-2016 **Physics II with calculus**, *UG course (Discussion)*, at University of Florida.
- 2014-2015 **Physics II without calculus**, *UG course (Discussion)*, at University of Florida.
- 2012 **Lab for Physics II without calculus**, *UG course*, at University of Florida.
- 2010-2011 **Lab for Physics I without calculus**, *UG course*, at University of Florida.

ADMINISTRATIVE DUTIES

- Faculty Coordinator**, International Relations.
- Member**, UG/PG Lab Equipment Purchasing Committee.
- Member**, Committee for designing a new interdisciplinary M. Tech. program titled Optical Communication and Quantum Electronics.
- Member**, Committee for designing new courses to be taught by foreign faculties.
- Member**, Doctoral Scrutiny Committee.

REFERENCES

1. **Prof. Peter Hirschfeld**, *Distinguished Professor*, Department of Physics, University of Florida, Gainesville, FL, USA. Email: pjh@phys.ufl.edu.
2. **Prof. Ilya Eremin**, *Professor*, Institute for Theoretical Physics III, Ruhr-University Bochum, Germany. Email: Ilya.Eremin@ruhr-uni-bochum.de.
3. **Prof. J. C. Séamus Davis**, *Professor*, Department of Physics, University of Oxford, UK. Email: jcseamusdavis@gmail.com.