

## Dr. Bahadur Singh

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### Positions

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03/2018-Present	Visiting Research Scientist at the Department of Physics, Northeastern University, Boston, Massachusetts 02115; USA
01/2018-Present	Postdoctoral Research Fellow at the SZU-NUS Collaborative Center and International Collaborative Laboratory of 2D Materials for Optoelectronic Science & Technology, College of Optoelectronic Engineering, Shenzhen University, Shenzhen 518060; China.
10/2015-12/2017	Postdoctoral Research Fellow at the Centre for Advanced 2D Materials and Graphene Research Centre, National University of Singapore, 117546; Singapore.
05/2015-09/2015	Project Scientist at the Department of Physics, Indian Institute of Technology, Kanpur, 208016; India.
09/2014-04/2015	Sr. Student Research Associate at the Department of Physics, Indian Institute of Technology, Kanpur, 208016; India.

### Education

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12/2009-05/2015	Ph.D. (Physics), Department of Physics, Indian Institute of Technology, Kanpur, India. <i>Supervisor:</i> Prof. R. Prasad <i>Grade:</i> 9.33/10.00
2007-2009	M.Sc. (Physics), Department of Physics, Himachal Pradesh University, Summer Hill, Shimla, India. <i>Grade:</i> 78.5% (First Class)
2004-2007	B.Sc. (Physics, Chemistry, Mathematics), Himachal Pradesh University, Shimla, India. <i>Grade:</i> 66.3% (First class)
2004	Intermediate (Physics, Chemistry, Mathematics), Central Board of Secondary Education, New Delhi, India. <i>Grade:</i> 78% (First class)
2002	Secondary school certificate (Science, Mathematics, Social Science), Central Board of Secondary Education, New Delhi, India. <i>Grade:</i> 77% (First class)

### Awards/Nomination

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2016	Nominated for the Royal Society Commonwealth Science Conference 2017.
2014	Received best oral presentation award in the International Conference on Condensed Matter Physics-2014 (ICOMP-2014), Shimla, India.
2014	Received cash award from Dean Resource Planning & Generation, DRPG IIT Kanpur for publication in journals listed in ISI web of science (FY 2010-2011).
2013	Received best paper award in the International Workshop on Computational Condensed Matter Physics-2013 (IWCCMP-2013), Gwalior, India.
2012	Received visiting student fellowship from Department of Physics, Northeastern University, Boston, Massachusetts, USA (Prof. Arun Bansil's group).

2011	Received MHRD senior research fellowship (SRF) for Research in India.
2009	Received MHRD junior research fellowship (JRF) for Research in India.
2009	Elected in <i>GATE-2009</i> physics examination (Highest ranked national level examination for admission in IIT's and other research institutes of national importance in India).
2008	Qualified <i>CSIR-UGC NET</i> examination in December 2008 (Highest ranked national level skill test for fostering faculty and other higher ranked positions in India).

## Research Experience

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2015-Present	Electronic structure calculations, phonon calculations, and tight-binding modeling based on density functional theory (DFT) of Weyl semimetals, Dirac semimetals, Nodal-line semimetals, Topological insulators, 2D novel materials as well charge density wave (CDW) phase in materials.
2009-2015	“First-principles investigations of topological phases in materials.” This was my Ph.D. topic in which I studied bulk and surface electronic structures of several selected materials with a focus on delineating the topological band order and extract the topological surface state properties, using the <i>ab-initio</i> density functional theory framework and <i>k·p</i> theory. I also predicted several new materials or thin films of materials which demonstrate the novel phenomena such as quantum spin Hall state, Dirac/Weyl semimetal or Rashba effect.
2010 – 2011	“Structural and electronic properties of thallium based topological insulators”. This was my PhD course work project under the supervision of Prof. R. Prasad at IIT Kanpur.
2009 – 2010	“Structural and electronic properties of TiO <sub>2</sub> ”. This was my course work project under the supervision of Prof. R. Prasad at IIT Kanpur.

## Research Interests and Highlights

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- The overarching goal of my research is to understand, predict, and engineer fundamental to functional physical properties that define a large class of materials as different as topological Weyl, Dirac or Nodal-line semimetals, topological insulators, Rashba systems and various emergent properties arising from their combinations. I plan to predict and engineer advanced materials with collective state phenomena and minimum physical dimensions suitable for advanced electronics and quantum engineering. I am also enthusiastic about learning and exploring new research areas including energy efficient materials and technologically, and environmentally relevant materials and thus building upon and extending my research experience.
- I have predicted, for the first time, several new Weyl semimetal candidates that are not limited to one material or single family but a wide variety of materials that can realize all different types of emergent single Weyl fermions (I-breaking, T- breaking, type-I or type-II) or double Weyl fermions, using novel band structure calculations. Among them, LaAlGe has been confirmed experimentally as first Weyl semimetal hosting emergent Lorentz-violating type II Weyl fermions.
- I have recently introduced the concept of “Saddle-like topological surface states” and predicted several candidate materials. This would be especially suited for opening up an exciting new

generation of studies addressing the interplay between topology and strong electron correlation physics.

- More recently, we have introduced the concept of “Topological Hopf and chain link semimetal states” and predicted  $\text{Co}_2\text{MnGa}$  as the first candidate material. This has been confirmed experimentally.
- I have predicted novel quantum spin-Hall state in Ge-based thin films or  $\text{TlBiS}_2$  thin films by either changing the thickness of a film or applying a transverse electric field to the thin films. In addition, I have demonstrated through ab-initio calculations that the thin films of  $\text{TlBiS}_2$  can be switched from trivial to quantum spin Hall state and thus are viable candidates for realizing a gating controlled on/off switch between the normal and quantum spin Hall state.
- Besides studying the topological phases, I have recently predicted stable charge density wave phase in the  $\text{TiSe}_2$  monolayers.

## Collaborations

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With the following professors, I have at least 1 paper (published, or submitted):

Prof. Arun Bansil (Northeastern University, Boston, USA), Prof. Hsin Lin (Institute of Physics, Academia Sinica, Taipei, Taiwan), Prof. Vitor M. Pereira (Centre for Advanced 2D Materials and Graphene Research Centre, NUS, Singapore), Prof. M. Z. Hasan (Princeton University, USA), Prof. Madhab Neupane (University of Central Florida, USA), Prof. R. Prasad (IIT Kanpur, India), Prof. Amit Agarwal (IIT Kanpur, India), Prof. Goutam Deo (IIT Kanpur, India), Prof. Sushil Auluck (NPL, India), Dr. Bipin Gupta (NPL, India), Dr. V. P. S. Awana (NPL, India), Prof. Shin-Ming Huang (National Sun Yat-Sen University, Taiwan), Prof. Tay-Rong Chang (National Cheng Kung University, Taiwan), Prof. Wei-Feng Tsai (Sun Yat-sen University, China), Prof. Horng-Tay Jeng (National Tsing Hua University, Taiwan), Prof. Bent Weber (NTU, Singapore), Prof. Qi Jie Wang (NTU, Singapore), Prof. Titus Neupert (University of Zurich, Switzerland), Prof. Guang Bian (University of Missouri, USA), Prof. Claudia Felser (Max Planck Institute for Chemical Physics of Solids, Germany)

I also continue my close collaborations with Prof. Arun Bansil from Northeastern University, USA, Prof. Hsin Lin, Prof. Vitor M. Pereira, and Prof. Lu Jiong from NUS, Singapore, Prof. Shin-Ming Huang from National Sun Yat-Sen University, Taiwan, Prof. R. Prasad and Prof. Amit Agarwal from IIT Kanpur, India, and Prof. Sushil Auluck from NPL, India.

## Referee of Journals

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Nature scientific reports, Nature Materials, Journal of Physics: Condensed Matter, Physica E: Low-dimensional Systems and Nanostructures

## Numerical Techniques and Computational Skills

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- I use the professional first-principles density functional theory based VASP (Vienna ab-initio simulation package) code. It is a complex package that performs *ab-initio* quantum-mechanical molecular dynamics (MD) simulations using pseudopotentials or the projector-augmented wave method and a plane wave basis set. I also use other first-principles codes such as Wien2K (commercial) and Quantum Espresso (commercial).
- I use the Phonopy code for the phonon spectrum and Wannier90 code for generating real space tight-

binding model of materials interfaced with the VASP.

- I have succeeded in incorporating the Matrix element effect and Circular dichroism to model the spectroscopies of the novel materials within the Unfolding band structure code (Internal Matlab code in Prof. Hsin Lin's group) with the first-principles band structure input.
- I use Matlab extensively for the programming as well for the analysis of first-principles output results. I also use Mathematica, Fortran 90 and C for programming.

## Teaching Experience

- Tutor (Three semesters) and Teaching assistant (Seven semesters) in the Department of physics, IIT Kanpur, India  
07/2013-12/2014 Tutor in PHY102: Introduction to Mechanics (Three semesters)  
Tutor for PHY621: Electronic Structure of Materials.  
07/2012-06/2013 Teaching assistant in PHY101 physics and preparatory lab for undergraduate students  
01/2010-06/2012 Teaching assistant in PHY461/461 M.Sc. physics lab for master students
- I believe students learn best when they are motivated to learn by seeing the value and importance of the information presented in the classroom. My teaching philosophy includes engaging and motivating students in learning fundamental physics to numerical simulation with a broad perspective to the underlying quest of science and technology.

## Professional Activities

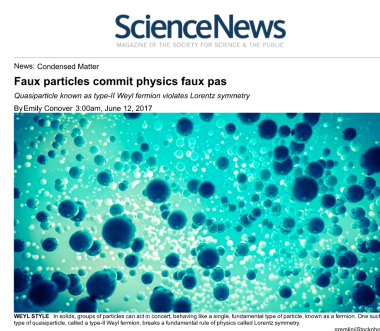
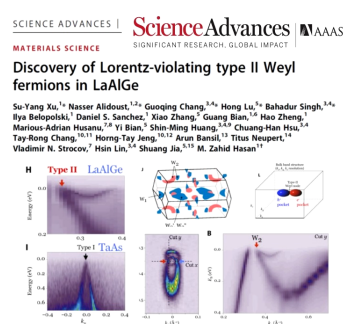
- 2012- Member of the American Physical Society (APS) and Material Research Society (MRS)
- 2014- Member of the Nature Publishing Group
- 2016- Member of the Materials Research Society Singapore (MRS-S)

## News Articles and Editors' Suggestion

### 1. Discovery of Lorentz-violating type II Weyl fermions in LaAlGe

Su-Yang Xu\*, Nasser Alidoust\*, Guoqing Chang\*, Hong Lu\*, **Bahadur Singh\***, Ilya Belopolski, Daniel Sanchez, Xiao Zhang, Guang Bian, Hao Zheng, Marius-Adrian Husanu, Yi Bian, Shin-Ming Huang, Chuang-Han Hsu, Tay-Rong Chang, Horng-Tay Jeng, Arun Bansil, Vladimir N Strocov, Hsin Lin, Shuang Jia, M Zahid Hasan (\*equal contribution); *Sci. Adv.* 3, e1603266 (2017)

-News article in ScienceNews (Magazine for the society for science & the public); Magazine issue: Vol. 191, No. 13, July 8, 2017, p. 14 (<https://www.sciencenews.org/article/faux-particles-commit-physics-faux-pas>)

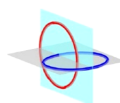


## 2. Topological Hopf and Chain Link Semimetal States and Their Application to $\text{Co}_2\text{MnGa}$

Guoqing Chang, Su-Yang Xu, Xiaoting Zhou, Shin-Ming Huang, **Bahadur Singh**, Baokai Wang, Ilya Belopolski, Jiaxin Yin, Songtian Zhang, Arun Bansil, Hsin Lin, and M. Zahid Hasan

Physical Review Letters **119**, 156401(2017)

-Published Editors' Suggestion



PHYSICAL REVIEW LETTERS

Highlights Recent Accepted Collections Authors Referees

EDITORS' SUGGESTION

Topological Hopf and Chain Link Semimetal States and Their Application to  $\text{Co}_2\text{MnGa}$

A new topological semimetal state is predicted, featuring three-dimensional band crossings that manifest as perpendicular, nontrivial links.

Guoqing Chang et al.  
Phys. Rev. Lett. **119**, 156401 (2017)

## Published and Submitted Papers (Summary of Publications)

Physical Review Letters	2 articles,	1 published,	1 under consideration
Physical Review B	8 articles,	6 published,	2 under consideration
Physical Review B:Rapid Communications	1 article,	1 published,	0 under consideration
Nature Communications	1 article,	1 published,	0 under consideration
Nature	1 article,	0 published,	1 under consideration
Nature Materials	1 article,	0 published,	1 under consideration
Nature Physics	1 article,	0 published,	1 under consideration
Nature Scientific reports	4 articles,	1 published,	3 under consideration
Nano Letters	1 article,	1 published,	0 under consideration
Science Advances	1 articles,	1 published,	0 under consideration
Journal of Applied Physics	1 article,	1 published,	0 under consideration
Physical chemistry chemical physics	1 article,	1 published,	0 under consideration
Quantum Matter	1 article,	1 published,	0 under consideration
Peer review conference proceedings	2 articles,	2 published,	0 under consideration

Total published and under consideration articles are 17 and 9, respectively.

Total number of citations and H-index are 257 and 7, respectively, from Google scholars.

## Peer-reviewed Journal Papers

1. **Bahadur Singh**, Xiaoting Zhou, Hsin Lin, and Arun Bansil, *Saddle-like topological surface states on the  $TT'X$  family of compounds ( $T, T' = \text{Transition metal}, X = \text{Si, Ge}$ )* Physical Review B **97**, 075125 (2018);. Preprint at arXiv:1703.04048
2. Guoqing Chang\*, **Bahadur Singh**\*, Su-Yang Xu\*, Guang Bian, Shin-Ming Huang, Chuang-Han Hsu, Ilya Belopolski, Nasser Alidoust, Daniel S. Sanchez, Hao Zheng, Hong Lu, Xiao Zhang, Yi Bian, Tay-Rong Chang, Horng-Tay Jeng, Arun Bansil, Han Hsu, Shuang Jia, Titus Neupert, Hsin Lin, M. Zahid Hasan, *Theoretical prediction of magnetic and noncentrosymmetric Weyl fermion semimetal states in the  $R\text{-Al-X}$  family of compounds ( $R = \text{rare earth}, \text{Al} = \text{aluminium}, X = \text{Si, Ge}$ )* (\*equal contribution) Physical Review B: Rapid Communications **97**, 041104 (2018). Preprint at arXiv:1604.02124
3. Xuechao Yu, Peng Yu, Di Wu, **Bahadur Singh**, Qingsheng Zeng, Hsin Lin, Wu Zhou, Zheng Liu, Qi Jie Wang, *Atomically thin noble metal dichalcogenide: a broadband mid-infrared semiconductor*, Nature communications **9**, 1545 (2018).
4. Koustuv Ray, Rahul Bhardwaj, **Bahadur Singh**, Goutam Deo, *Descriptor based understanding of the activity by  $\text{Al}_2\text{O}_3$  supported Ni and cheap Ni based alloy catalysts* Physical Chemistry Chemical Physics 2018; In press

5. **Bahadur Singh**, Chuang-Han Hsu, Wei-Feng Tsai, Vitor M. Pereira, and Hsin Lin, *Stable charge density wave phase in a 1T-TiSe<sub>2</sub> monolayer*  
Physical Review B **95**, 245136 (2017); Preprint at arXiv:1702.08329
6. Su-Yang Xu\*, Nasser Alidoust\*, Guoqing Chang\*, Hong Lu\*, **Bahadur Singh\***, Ilya Belopolski, Daniel Sanchez, Xiao Zhang, Guang Bian, Hao Zheng, Marius-Adrian Husanu, Yi Bian, Shin-Ming Huang, Chuang-Han Hsu, Tay-Rong Chang, Horng-Tay Jeng, Arun Bansil, Vladimir N Strocov, Hsin Lin, Shuang Jia, M Zahid Hasan, *Discovery of Lorentz-violating Weyl fermion semimetal state in LaAlGe materials* (\*equal contribution)  
Science Advances **3**, e1603266 (2017). Preprint at arXiv:1603.07318
7. Guoqing Chang, Su-Yang Xu, Xiaoting Zhou, Shin-Ming Huang, **Bahadur Singh**, Baokai Wang, Ilya Belopolski, Jiaxin Yin, Songtian Zhang, Arun Bansil, Hsin Lin, and M. Zahid Hasan, *Topological Hopf and chain link semimetal states and their application to Co<sub>2</sub>MnGa*  
Physical Review Letters **119**, 156401(2017). Preprint at arXiv:1712.00055.
8. Michael S. Lodge, Guoqing Chang, Cheng-Yi Huang, **Bahadur Singh**, Jack Hellerstedt, Mark T. Edmonds, Dariusz Kaczorowski, Md Mofazzel Hosen, Madhab Neupane, Hsin Lin, Michael S. Fuhrer, Bent Weber, and Masahiro Ishigami, *Observation of Effective Pseudospin Scattering in ZrSiS*  
Nano Letters **17**, 7213 (2017). Preprint at arXiv:1706.05165
9. Barun Ghosh, **Bahadur Singh\***, R Prasad, Amit Agarwal, *Electric-field tunable Dirac semimetal state in phosphorene thin films* (\*Corresponding author)  
Physical Review B **94**, 205426 (2016). Preprint at arXiv:1609.03339
10. **Bahadur Singh**, H. Lin, R. Prasad, and A. Bansil, *Role of surface termination in realizing well-isolated topological surface states within the bulk band gap in TlBiSe<sub>2</sub> and TlBiTe<sub>2</sub>*  
Physical Review B **93**, 085113 (2016). Preprint at arXiv:1602.02288.
11. Guoqing Chang, Su-Yang Xu, Hao Zheng, **Bahadur Singh**, Chuang-Han Hsu, Ilya Belopolski, Daniel S Sanchez, Guang Bian, Nasser Alidoust, Hsin Lin, M Zahid Hasan, *Room-temperature magnetic topological semimetal state in half-metallic Heusler Co<sub>2</sub>TiX (X=Si, Ge, or Sn)*  
Nature Scientific Reports **6**, 38839 (2016). Preprint at arXiv:1603.01255
12. **Bahadur Singh**, H. Lin, R. Prasad, and A. Bansil, *Topological phase transition and quantum spin Hall state in TlBiS<sub>2</sub>*  
Journal of Applied Physics **116**, 033704 (2014). Preprint at arXiv:1407.4740.
13. **Bahadur Singh**, H. Lin, R. Prasad, and A. Bansil, *Topological phase transition and two-dimensional topological insulators in Ge-based thin films*  
Physical Review B **88**, 195147 (2013). Preprint at arXiv:1312.0379.
14. **Bahadur Singh**, Ashutosh Sharma, H. Lin, M.Z. Hasan, R. Prasad and A. Bansil, *Topological electronic structure and Weyl semimetal in the TlBiSe<sub>2</sub> class of semiconductors*  
Physical Review B **86**, 115208 (2012). Preprint at arXiv:1209.5896

### Submitted Papers (Under Consideration)

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15. **Bahadur Singh**, Sougata Mardanya, Chenliang Su, Hsin Lin, Amit Agarwal, and Arun Bansil, *Starfruit-like nodal semimetal to Dirac and Weyl semimetal in CaAuAs*  
Physical Review B (2018).

16. Bahadur Singh, Guoqing Chang, Tay-Rong Chang, Shin-Ming Huang, Chenliang Su, Ming-Chieh Lin, Hsin Lin, and Arun Bansil, *Tunable double-Weyl Fermion semimetal state in the SrSi<sub>2</sub> material class*  
Nature Scientific Reports (2018).
17. Guoqing Chang, Daniel S. Sanchez, Benjamin J. Wieder, Su-Yang Xu, Frank Schindler, Ilya Belopolski, Shin-Ming Huang, **Bahadur Singh**, Di Wu, Titus Neupert, Tay-Rong Chang, Hsin Lin, M. Zahid Hasan, *Kramers theorem-enforced Weyl fermions*  
Nature Physics (2017). Preprint at arXiv:1611.07925
18. Ilya Belopolski, Daniel S. Sanchez, Guoqing Chang, Kaustuv Manna, Benedikt Ernst, Su-Yang Xu, Songtian S. Zhang, Hao Zheng, Jiabin Yin, **Bahadur Singh**, Guang Bian, Daniel Multer, Xiaoting Zhou, Shin-Ming Huang, Baokai Wang, Arun Bansil, Hsin Lin, Claudia Felser, and M. Zahid Hasan, *A three-dimensional magnetic topological phase*  
Nature (2017). Preprint at arXiv:1712.09992
19. Guoqing Chang, Benjamin J. Wieder, Frank Schindler, Daniel S. Sanchez, Ilya Belopolski, Shin-Ming Huang, **Bahadur Singh**, Di Wu, Tay-Rong Chang, Titus Neupert, Su-Yang Xu, Hsin Lin, and M. Zahid Hasan, *Universal Topological Electronic Properties of Nonmagnetic Chiral Crystals*  
Nature Materials (2017).
20. Chuan Chen, **Bahadur Singh**, Hsin Lin, and Vitor M. Pereira, Reproduction of the charge density wave phase diagram in 1T-TiSe<sub>2</sub> exposes its excitonic character  
Physical Review X (2017). Preprint at arXiv:1712.04967
21. Bipin Kumar Gupta, Rabia Sultana, Satbir Singh, Vijeta Singh, **Bahadur Singh**, O.N. Srivastava, S. Auluck and V.P.S. Awana, *Unexplored Photoluminescence from Bulk and Mechanically Exfoliated Few Layers of Bi<sub>2</sub>Te<sub>3</sub>*  
Nature Scientific Reports (2017).
22. **Bahadur Singh**, H. Lin, R. Prasad and A. Bansil, *Giant Rashba-type spin-splitting and topological insulating phase in the inversion asymmetric Sb<sub>2</sub>Se<sub>2</sub>Te*  
Nature Scientific Reports (2017).
23. **Bahadur Singh**, H. Lin, R. Prasad and A. Bansil, *Surface atomic structure dependence of electronic structure and spin-polarization of the topological surface states in GeBi<sub>2</sub>Te<sub>4</sub>*  
Physical Review B (2017).

### Peer-reviewed Conference Papers

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24. **Bahadur Singh** and R. Prasad, *Spin-texture of the non-trivial surface state of topological insulator Sb<sub>2</sub>Te<sub>3</sub>*  
Quantum Matter **5**, 362 (2016).
25. **Bahadur Singh** and R. Prasad, *Orbital selective spin-texture in a topological insulator*  
AIP Conf. Proc. **1661**, 110022 (2015).
26. **Bahadur Singh** and R. Prasad, *Termination dependent surface states and spin-arrangement on the surface of a topological insulator*  
International Conference on Materials, Energy and Environments (ICMEE) series.

## Invited Talks

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1. *Topological materials and 2D thin films beyond graphene*  
Department of Physics, Himachal Pradesh University Shimla, India, March 2018
2. *Theoretical modelling of 2D materials and topological insulators*  
ICL2DMOST, College of Optoelectronic Engineering, Shenzhen University, China, January 2018
3. *Topological Semimetals and 2D materials*  
CA2DM, National University of Singapore, Singapore, August 2017.
4. *Topological Materials: From Insulators to Semimetals*  
Department of Physics, Indian Institute of Technology Kanpur, India, April 2017.
5. *Discovery of first type-II Weyl fermion semimetal state in LaAlGe materials*  
Department of Physics, Indian Institute of Technology Kanpur, India, February 2017.
6. *Discovery of topological insulator and Weyl semimetal state in TlBiSe<sub>2</sub> and LaAlGe class of materials*  
Institute of Nano Science and Technology, Mohali, India, February 15, 2017.
7. *Topological insulator and quantum spin Hall state in TlBiSe<sub>2</sub> class of ternary semiconductors*  
EMN Meeting on Quantum, Phuket, Thailand, April 2016.

## Contributed Talks

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8. *Saddle-like topological surface states on the TTX family of compounds (T, T' = Transition metal, X= Si, Ge), **Bahadur Singh**, Xiaoting Zhou, Hsin Lin, Arun Bansil. American Physical Society March Meeting, Los Angeles, California, USA, March 2018*
9. *Topological Hopf and Chain Link Semimetal States and Their Application to Co<sub>2</sub>MnGa*, Daniel Multer, Guoqing Chang, Suyang Xu, Xiaoting Zhou, Shin-Ming Huang, **Bahadur Singh**, Baokai Wang, Ilya Belopolski, Jiaxin Yin, Songtian Sonia Zhang, Arun Bansil, Hsin Lin, and Zahid Hasan. American Physical Society March Meeting, Los Angeles, California, USA, March 2018
10. *Experimental investigation of Co<sub>2</sub>MnGa: candidate for the first intrinsic, three-dimensional topological magnet*, Ilya Belopolski, Daniel Sanchez, Guoqing Chang, Kaustuv Manna, Benedikt Ernst, Suyang Xu, Songtian Sonia Zhang, Hao Zheng, Jiaxin Yin, **Bahadur Singh**, Guang Bian, Daniel Multer, Xiaoting Zhou, Shin-Ming Huang, Baokai Wang, Arun Bansil, Hsin Lin, Claudia Felser, and Zahid Hasan. American Physical Society March Meeting, Los Angeles, California, USA, March 2018
11. *Universal Topological Electronic Properties of Nonmagnetic Chiral Crystals*, Guoqing Chang, Benjamin Wieder, Frank Schindler, Daniel Sanchez, Ilya Belopolski, Shin-Ming Huang, **Bahadur Singh**, Di Wu, Tay-Rong Chang, Titus Neupert, Suyang Xu, Hsin Lin, and Zahid Hasan. American Physical Society March Meeting, Los Angeles, California, USA, March 2018
12. *Discovery of Lorentz-violating type-II Weyl fermions in LaAlGe*, Daniel S. Sanchez, Su-Yang Xu, Nasser Alidoust, Guoqing Chang, Hong Lu, **Bahadur Singh**, Ilya Belopolski, Xiao Zhang, Guang Bian, Hao Zheng, Marius-Adrian Husanu, Yi Bian, Shin-Ming Huang, Chuang-Han Hsu, Tay-Rong Chang, Horng-Tay Jeng, Arun Bansil, Titus Neupert, Vladimir N. Strocov, Hsin Lin, and Shuang Jia,



- M. Zahid Hasan. American Physical Society March Meeting, New Orleans, Louisiana, USA, March 2017
13. *Strategies for Designing Magnetic Weyl Semimetals*, Guoqing Chang, Su-Yang Xu, Hao Zheng, **Bahadur Singh**, Chuang-Han Hsu, Shin-Ming Huang, Guang Bian, Ilya Belopolski, Daniel S. Sanchez, Nasser Alidoust, Tay-Rong Chang, Hong Lu, Xiao Zhang, Yi Bian, Zhi-Ming Yu, Shengyuan A. Yang, Horng-Tay Jeng, Titus Neupert, Shuang Jia, Arun Bansil, Hsin Lin, and M. Zahid Hasan. American Physical Society March Meeting, New Orleans, Louisiana, USA, March 2017
  14. *Quasiparticle interference mapping of ZrSiS*, Michael Lodge, Md Mofazzle Hosen, Madhab Neupane, Masa Ishigami, Guoqing Chang, **Bahadur Singh**, Hsin Lin, Bent Weber, Jack Hellerstedt, Mark Edmonds, Michael Fuhrer, and Dariusz Kaczorowski. American Physical Society March Meeting, New Orleans, Louisiana, USA, March 2017
  15. *Identifying the Dirac line node in the 3D semimetal ZrSiS*, Bent Weber, Michael S Lodge, Guoqing Chang, **Bahadur Singh**, Jack Hellerstedt, Mark Edmonds, Dariusz Kaczorowski, Md Mofazzel Hosen, Madhab Neupane, Hsin Lin, Michael S Fuhrer, and Masa Ishigami. American Physical Society March Meeting, New Orleans, Louisiana, USA, March 2017
  16. *Role of Surface Termination in Realizing Well-Isolated Topological Surface States in TlBiSe<sub>2</sub> and TlBiTe<sub>2</sub>*, **Bahadur Singh**, Hsin Lin, R. Prasad, and A. Bansil. IUMRS-ICEM2016, Suntec Singapore, July 2016.
  17. *A Computational Approach to Understand the Promotional Effect in Ni-Fe Bimetallic Catalyst*, Koustuv Ray, Dharmendra Pandey, **Bahadur Singh**, Rajendra Prasad and Goutam Deo, “”, XII European Congress on Catalysis, Kazan, Russia, September 2015.
  18. *Orbital selective spin-texture in a topological insulator*, **Bahadur Singh** and R. Prasad. International conference on condensed matter physics-2014 (ICCMP-2014), Shimla, India, November 2014.
  19. *Topological phases and Weyl semimetal in thallium based III-V-VI<sub>2</sub> ternary chalcogenides*, **Bahadur Singh**, R. Prasad, H. Lin, M.Z. Hasan, A. Bansil. MRS Fall meeting, Boston, MA, USA, November 2012.

### **Schools, Conferences and Contributed posters**

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20. Workshop on electron-electron interactions in topological materials, Yale-NUS College, Singapore, June 2017.
21. ICTS school and discussion meeting on strongly correlated systems-from models to materials, IISc Bangalore, India, January 2014.
22. International E-workshop on condensed matter physics and material science (IWCCMP-2013), ABV-IITM Gwalior, India, November 2013.  
Poster Title: “*Spin-texture of the non-trivial surface state of topological insulator Sb<sub>2</sub>Te<sub>3</sub>*”
23. School and workshop on electronic structure calculations with HPC systems, Uttarakhand, India, April 2013
24. International workshop on computational material science using full potential methods-international conference on advanced materials (ICAM-2011), Coimbatore, India, December 2011.
25. International conference on quantum effects in solids of today (I-ConQuEST) and K.S. Krishnan

discussion meeting on the frontiers of quantum science, NPL New Delhi, India, December 2010.  
Poster Title: “*Existence of topological phase in thallium based III-V-VI<sub>2</sub> ternary chalcogenides*”

## Personal Profile

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- Father's Name : Phuman Ram
- Date of birth : 24/09/1986
- Nationality : Indian
- Gender : Male
- Marital Status : Married
- Spouse Name : Dr. (Mrs.) Kanchan Bala
- Languages Known : Hindi, English, Punjabi
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## Relevant Course-work

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- Computational Physics
- Computer Simulations in Physics
- Condensed Matter Physics
- Electronic Structure of Materials
- Density functional theory
- Quantum Mechanics

## References

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