Yefan Tian

CONDENSED MATTER AND MATERIAL PHYSICIS · NMR

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EDUCATION BACKGROUND

Ph.D. Candidate in Physics — Aug. 2015 – Present

Texas A&M University, College Station, TX, USA
Specialized in experimental condensed matter and material physics.

M.S. Candidate in Physics — Aug. 2015 – Present

Texas A&M University, College Station, TX, USA
Specialized in experimental condensed matter and material physics.

Trainee in D^{3}EM Program — Jan. 2017 – Aug. 2018

Texas A&M University, College Station, TX, USA
Developed interdisciplinary skills in materials science, informatics, and engineering design.

B.S. in Applied Physics — Aug. 2011 – Jun. 2015

University of Science and Technology of China, Hefei, Anhui, China
Specialized in condensed matter physics.

RESEARCH INTERESTS

1. Dirac/Weyl Semimetals
2. Topological Superconductors
3. Topological Insulators
4. Machine Learning
5. Materials Design
6. Thermoelectric Materials

PROFESSIONAL SKILLS

1. Nuclear Magnetism Resonance Spectroscopy (NMR)
2. Magnetic Properties Measurement System (MPMS)
3. Physical Properties Measurement System (PPMS)
4. Density Functional Theory Calculation (DFT)
5. Wavelength-Dispersive Spectroscopy (WDS)
6. X-Ray Diffraction (XRD)
7. Chemical Vapor Deposition (CVD)

RESEARCH EXPERIENCE

Graduate Research Assistant Jan. 2017 – Present

Department of Physics and Astronomy, TAMU, TX
Advisor: Prof. Joseph H. Ross, Jr.

- NMR investigations of topological quantum materials
  - Topological nodal-line and nodal-loop semimetals ZrSi(Te, Se, S)
  - Dirac semimetal $ZrTe_2$
  - Sc(Pd, Pt)Bi
  - Topological insulator $ZrTe_5$
    - Dirac electron behavior and NMR evidence for topological band inversion in $ZrTe_5$
    - NMR study of quantum effect in topological insulator $ZrTe_5$
- NMR investigations of advanced thermoelectric materials
  - Half-Heusler
    - Native defects and impurity band behavior in half-Heusler thermoelectric NbFeSb
    - Defect charging and resonant levels in half-Heusler $Nb_{1-x}Ti_xFeSb$
    - Half-Heusler thermoelectric materials: NMR studies
  - Skutterudite
    - Charge-carrier behavior in Ba-, Sr- and Yb-filled $CoSb_3$: NMR and transport studies
    - NMR study of doped skutterudites $Yb_xCo_4Sb_{12}$
  - Tetrahedrite
    - Structure change and rattling dynamics in $Cu_{12}Sb_4S_{13}$ tetrahedrite: an NMR study
    - Copper ion dynamics and phase segregation in Cu-rich tetrahedrite: an NMR study

D^3EM Trainee Aug. 2017 – Present

Science and Engineering Interdisciplinary Program, TAMU, TX
Advisor: Prof. Raymundo Arróyave

- Machine learning approach to FINEMET-type soft magnetic nanocrystalline materials design

Undergraduate Research Assistant May 2014 – May 2015

National Synchrotron Radiation Laboratory, USTC, China
Advisor: Prof. Li Song

- MoO_2 nanoparticles/3D graphene applications in lithium batteries
  [Electrochim. Acta **174**, 8 (2015)]
- CVD growth of graphene synthesized for supercapacitors

Research Student Oct. 2013 – Mar. 2015

Hefei National Laboratory for Physical Sciences at the Microscale, USTC, China
Advisor: Prof. Tao Wu and Associate Prof. Qinwei Shi

- Electric transport of Rashba semiconductor BiTeCl
- Computational calculation of localization length in 1D materials

Undergraduate Research Group Leader Sep. 2013 – Jan. 2014

Physics Experiment Teaching Center, USTC, China
Advisor: Prof. Zengming Zhang

- Synthesis and luminescence properties of nanomaterial ($NaYbF_4$:Tm^{3+})@CaF_2

TEACHING EXPERIENCE

Graduate Teaching Assistant

Department of Physics and Astronomy, TAMU, TX

- 2019 Fall: PHYS 201 (College Physics I)
- 2016 Fall: PHYS 201 (College Physics I)
- 2016 Summer: PHYS 201 (College Physics I)
- 2016 Spring: Physics Help Desk
- 2015 Fall: Physics Help Desk

Undergraduate Teaching Assistant

School of Physical Sciences, USTC, China

- 2014 Fall: Physics I (Classical Mechanics)

HONORS AND AWARDS

- Outstanding Undergraduate Scholarship (2014)
- Outstanding Undergraduate Scholarship (2013)
- Third Prize of USTC Optics Articles Competition (2013)
- Outstanding Undergraduate Scholarship (2012)

OTHER SKILLS

Computer Skills

- **Advanced**: Microsoft Office, LaTeX
- **Intermediate**: HTML, PYTHON, Matlab, Mathematica, C/C++
- **Basic**: LabVIEW

Coursera Courses

- Machine Learning
- Neural Networks and Deep Learning
- Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
- Structuring Machine Learning Projects
- Convolutional Neural Networks
- Sequence Models

Language Skills

- Mandarin Chinese (*Native language*)
- English (*Professional fluency*)
- Japanese (*Basic oral and listening skills*)
- Korean (*Limited words and phrases*)
- Spanish (*Hola level*)

EXTRACURRICULAR ACTIVITIES

- TAMU Physics & Engineering Festival (2016 – 2018)
- Student Union of USTC (2011 – 2013)
- Volunteers Association of USTC (2011 – 2012)

PUBLICATIONS

In preparation

18. **Yefan Tian**, and Joseph H. Ross, Jr., *TBD*: NMR study of ZrSiTe.
17. **Yefan Tian**, and Joseph H. Ross, Jr. *TBD*: NMR study of ZrSiSe.
16. **Yefan Tian**, and Joseph H. Ross, Jr. *TBD*: NMR study of ZrSiS.
15. **Yefan Tian**, Yuqi Chen, Ali A. Sirusi, Nader Ghassemi, Sekine Chihiro, and Joseph H. Ross, Jr., NMR study of doped skutterudites $Yb_xCo_4Sb_{12}$.
14. Om Prakash, **Yefan Tian**, Joseph H. Ross, Jr., and Meigan C. Aronson, *TBD*: $ScPd_xPt_{1-x}Bi$.
13. **Yefan Tian**, Rui Li, Nader Ghassemi, and Joseph H. Ross, Jr., Revealing topological nature of Dirac semimetal $ZrTe_2$: an NMR study.
12. **Yefan Tian**, Nader Ghassemi, and Joseph H. Ross, Jr., NMR study of quantum effect in topological insulator $ZrTe_5$.

Submitted

11. **Yefan Tian**, Farit G. Vagizov, Nader Ghassemi, Wuyang Ren, Hangtian Zhu, Zhiming Wang, Zhifeng Ren, and Joseph H. Ross, Jr., Defect charging and resonant levels in half-Heusler $Nb_{1-x}Ti_xFeSb$, arXiv:1912.09643.
10. C. M. N. Kumar, K. Dema, R. Baral, **Yefan Tian**, Rui Li, N. Poudel, K. Gofryk, N. Barišić, B. Kiefer, Joseph H. Ross, Jr., and H. S. Nair, Large magnetocaloric effect in a frustrated garnet with no long-range magnetic order.

Peer-reviewed publications

9. **Yefan Tian**, Nader Ghassemi, Wuyang Ren, Hangtian Zhu, Shan Li, Qian Zhang, Zhiming Wang, Zhifeng Ren, and Joseph H. Ross, Jr., Half-Heusler thermoelectric materials: NMR studies, Accepted by J. Appl. Phys. **128** (2020).
8. Yuhao Wang*, **Yefan Tian***, Tanner Kirk, Omar Laris, Joseph H. Ross, Jr., Ronald D. Noebe, Vladimir Keylin, and Raymundo Arróyave, Accelerated design of Fe-based soft magnetic materials using machine learning and stochastic optimization, Acta Mater. **194**, 144 (2020).
   *Contributed equally
7. Nader Ghassemi, **Yefan Tian**, Xu Lu, Yanci Yan, Xiaoyuan Zhou, and Joseph H. Ross, Jr., Copper ion dynamics and phase segregation in Cu-rich tetrahedrite: an NMR study, J. Phys. Chem. C **124**, 3973 (2020).
6. **Yefan Tian**, Nader Ghassemi, and Joseph H. Ross, Jr., Dirac electron behavior and NMR evidence for topological band inversion in $ZrTe_5$, Phys. Rev. B **100**, 165149 (2019).
5. **Yefan Tian**, Ali A. Sirusi, Sedat Ballikaya, Nader Ghassemi, Ctirad Uher, and Joseph H. Ross, Jr., Charge-carrier behavior in Ba-, Sr- and Yb-filled $CoSb_3$: NMR and transport studies, Phys. Rev. B **99**, 125109 (2019).
4. Nader Ghassemi, Xu Lu, **Yefan Tian**, Emily Conant, Yanci Yan, Xiaoyuan Zhou, and Joseph H. Ross, Jr., Structure change and rattling dynamics in $Cu_{12}Sb_4S_{13}$ tetrahedrite: an NMR study, ACS Appl. Mater. Interfaces **10**, 36010 (2018).
3. **Yefan Tian**, Hangtian Zhu, Wuyang Ren, Nader Ghassemi, Emily Conant, Zhiming Wang, Zhifeng Ren, and Joseph H. Ross, Jr., Native defects and impurity band behavior in half-Heusler thermoelectric NbFeSb, Phys. Chem. Chem. Phys. **20**, 21960 (2018).
2. Yu Zhou, Qin Liu, Daobin Liu, Hui Xie, Guixian Wu, Weifeng Huang, **Yefan Tian**, Qun He, Adnan Khalil, Yasir A. Haleem, Ting Xiang, Wangsheng Chu, Chongwen Zou, Li Song,

Carbon-coated MoO_2 dispersed in three-dimensional graphene aerogel for lithium-ion battery, Electrochim. Acta **174**, 8 (2015).

1. Zhigang Wang, **Yefan Tian**, Tetraquark state candidates: Y(4140), Y(4274) and X(4350), Int. J. Mod. Phys. A **30**, 1550004 (2015).

CONFERENCES AND WORKSHOPS

12. Nader Ghassemi, **Yefan Tian**, Xu Lu, Joseph H. Ross, Jr., Copper occupation and dynamics in Cu rich tetrahedrite: an NMR study, APS March Meeting 2020, **Oral** Presentation, R21.00012 (2020, Denver, CO).
11. **Yefan Tian**, Nader Ghassemi, and Joseph H. Ross, Jr., NMR investigation of topological quantum material $ZrTe_5$, APS March Meeting 2020, **Oral** Presentation, F60.00012 (2020, Denver, CO).
10. **Yefan Tian**, Rui Li, Farit Vagizov, Nader Ghassemi, Wuyang Ren, Hangtian Zhu, Zhifeng Ren and Joseph H. Ross, Jr., NMR and Mössbauer study of p-type half-Heusler thermoelectrics $Nb_{1-x}Ti_xFeSb$, APS March Meeting 2020, **Oral** Presentation, G27.00015 (2020, Denver, CO).
9. Nader Ghassemi, **Yefan Tian**, Xu Lu, Joseph H. Ross, Jr., NMR study of doped tetrahedrite thermoelectric materials, 2019 Texas A&M Conference on Energy, **Oral** Presentation (2019, College Station, TX).
8. **Yefan Tian**, Yuhao Wang, Tanner Kirk, Laris Omar, Joseph H. Ross, Jr., Ronald D. Noebe, and Raymundo Arróyave, Machine learning aided design of soft magnetic materials, 2019 Texas A&M Conference on Energy, **Poster** Presentation (2019, College Station, TX).
7. **Yefan Tian**, Yuhao Wang, Tanner Kirk, Laris Omar, Joseph H. Ross, Jr., Ronald D. Noebe, and Raymundo Arróyave, A machine learning approach for accelerating the design of soft magnetic alloys, 2019 Data Science in Materials Workshop, **Poster** Presentation (2019, Houston, TX).
6. Nader Ghassemi, Xu Lu, Xiaoyuan Zhao, Yanci Yan, **Yefan Tian**, and Joseph H. Ross, Jr., NMR study of doped tetrahedrite thermoelectric materials, APS March Meeting 2019, **Oral** Presentation, S47.00011 (2019, Boston, MA).
5. **Yefan Tian**, Yuhao Wang, Joseph H. Ross, Jr., Raymundo Arróyave, Accelerated design of Fe-based soft magnetic materials using machine learning and stochastic optimization, APS March Meeting 2019, **Poster** Presentation, T70.00267 (2019, Boston, MA).
4. **Yefan Tian**, Ali A. Sirusi, Sedat Ballikaya, Nader Ghassemi, Ctirad Uher, and Joseph H. Ross, Jr., NMR investigation of filled skutterudites $Ba_xYb_yCo_4Sb_{12}$ and $A_xCo_4Sb_{12}$ (A = Ba, Sr), APS March Meeting 2019, **Oral** Presentation, R47.00008 (2019, Boston, MA).
3. **Yefan Tian**, Hangtian Zhu, Wuyang Ren, Zhifeng Ren, Joseph H. Ross, Jr., NMR and magnetic study of half-Heusler semiconductor NbFeSb, APS March Meeting 2018, **Poster** Presentation, G60.00304 (2018, Los Angeles, CA).
2. **Yefan Tian**, Ali Sirusi, Joseph H. Ross, Jr., Sedat Ballikaya, Ctirad Uher, Yuqi Chen, Chihiro Sekine, NMR study of partially filled skutterudites $A_xCo_4Sb_{12}$ (A = Yb, Ba, Sr, Ca) and $Ba_xYb_yCo_4Sb_{12}$, APS March Meeting 2017, **Oral** Presentation, Y36.00002 (2017, New Orleans, LA).
1. Nader Ghassemi, Ali Sirusi, Laziz Saribaev, Emily Conant, **Yefan Tian**, Probing new thermoelectric materials through NMR and computational techniques, 2016 Texas A&M Conference on Energy, **Poster** Presentation (2016, College Station, TX).