

Curriculum Vitae

TIJIANG LIU

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Education

- 2006 ~ 2010 Ph.D. in Physics, Advisor: Zhiqiang Mao
Department of Physics and Engineering Physics, Tulane University
- 2003 ~ 2006 M.S. in Computational Physics, Advisor: Zhengying Pan
Institute of Modern Physics, Fudan University, China
- 1999 ~ 2003 B.S. in Applied Physics
Department of Physical Engineering, Zhengzhou University, China

Work experience

- 2011 ~ Present Postdoctoral Researcher, Louisiana State University
- 2006 ~ 2010 Research/Teaching Assistant, Tulane University
- 2004 ~ 2006 Research/Teaching Assistant, Fudan University, China

Technical Expertise

Materials Synthesis: extensive experience with crystal synthesis using various techniques: solid solution, vapor transport (e.g. sealed in evacuated quartz ampoules or in controlled atmosphere), and floating-zone method (crucible-free growth of large single crystal). Have succeeded in growing single crystals:

- 1) high T_C superconductors ($\text{Fe}_{1+y}(\text{Te}_{1-x}\text{Se}_x)$ system, $\text{K}_{0.8}\text{Fe}_2\text{Se}_2$ by solid solution method);
- 2) Ruthenates series by floating zone method including spin triplet superconductor (Sr_2RuO_4), Mott insulator (Ca_2RuO_4) and its doped materials by various elements (Ti, V, Fe, Co, Ni, Cu, Sr), itinerant magnet $\text{Sr}_3\text{Ru}_2\text{O}_7$ and its doped materials by various elements (Ca, Mn, Ti), Metamagnet $\text{Sr}_4\text{Ru}_3\text{O}_{10}$ and its doped materials ($\text{Sr}_{1-x}\text{Ca}_x$) $_4\text{Ru}_3\text{O}_{10}$;
- 3) large high purity single crystal Fe_3O_4 by floating zone method;
- 4) ternary molybdenum oxides InMo_4O_6 by vapor transport;

Characterization: Crystal structure simulation (GSAS) and analysis based on powder x-ray diffraction; Energy Dispersive X-ray analysis for determining the compositions based on scanning electron microscope (SEM); Electronic transport measurements including four-probe resistivity, angle resolved resistivity and five-probe Hall coefficients measurements using *various techniques for different material system*; Magnetic transport measurements including DC & AC magnetic susceptibility measurement based on Physical Property Measurement System (PPMS) by Quantum Design and Angle resolved

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magnetic susceptibility measurement based on Magnetic Property Measurement System (MPMS) by Quantum Design; Heat capacity measurement based on PPMS;

Fabrication: advanced knowledge of thin film growth; interface lithography; extensive experience with thermal evaporation for metal deposition.

Cryogenics: extensive experience with low-temperature system equipped with ^3He fridges, dilution refrigerator and a variety of other cryostats; operation and maintenance of PPMS and MPMS-SQUID-VSM with ever cool systems;

Vacuum System: vacuum techniques including mechanical, diffusion, turbo-molecular pumps. Having designed and built up a pump station; operation and maintenance of vacuum evaporation deposition system.

Computing Skills: extensive experience with programming in FORTRAN, C, C++; computer data acquisition and instrument interfacing using LabView;

Presentations

- 2011. 03 APS March Meeting, "Hall effect study of iron chalcogenide $\text{Fe}_{1+y}(\text{Te}_{1-x}\text{Se}_x)$ "
- 2010. 03 APS March Meeting, "Unusual Hall Effects Caused By Orbital Dependent Magnetism in $\text{Sr}_4\text{Ru}_3\text{O}_{10}$ "
- 2009. 03 APS March Meeting, "Charge-carrier localization induced by excess Fe in the superconductor $\text{Fe}_{1+y}\text{Te}_{1-x}\text{Se}_x$ "

Publications

1. **T. J. Liu**, J. Hu, B. Qian, D. Fobes, Z. Q. Mao, W. Bao, M. Reehuis, S. A. J. Kimber, K. Prokeš, S. Matas, D. N. Argyriou, A. Hiess, A. Rotaru, H. Pham, L. Spinu, Y. Qiu, V. Thampy, A. T. Savici, J. A. Rodriguez, and C. Broholm, "From $(\pi,0)$ magnetic order to superconductivity with (π,π) magnetic resonance in $\text{Fe}_{1.02}\text{Te}_{1-x}\text{Se}_x$ ", *Nature Mater.* **9**, 718 (2010). [doi:10.1038/nmat2800](https://doi.org/10.1038/nmat2800)
2. **T. J. Liu**, J. Hu, B. Qian, A. Rotaru, L. Spinu, Z.Q. Mao, "Unusual scaling behavior of Hall effects in $\text{Fe}_{1.2}(\text{Te}_{1-x}\text{Se}_x)$ ", To be submitted in *Phys. Rev. B*
3. J. Hu, **T. J. Liu**, B. Qian, A. Rotaru, L. Spinu, Z.Q. Mao, " Calorimetric Evidence of Multiband Strong-Coupling Superconductivity in $\text{Fe}(\text{Te}_{0.57}\text{Se}_{0.43})$ Single Crystal", To be published in *Phys. Rev. B*
4. L. D. Miao, W. Y. Zhang, **T. J. Liu**, J. Peng, J. Hu, Z. Q. Mao, D. H. Kim, "", To be submitted in *Appl. Phys. Lett*
5. **T. J. Liu**, X. Ke, B. Qian, J. Hu, D. Fobes, E. K. Vehstedt, H. Pham, J. H. Yang, M. H. Fang, L. Spinu, P. Schiffer, Y. Liu, and Z. Q. Mao, "Charge-carrier localization induced by excess Fe in the superconductor $\text{Fe}_{1+y}\text{Te}_{1-x}\text{Se}_x$ ", *Phys. Rev. B* **80**, 174509 (2009). [doi: 10.1103/PhysRevB.80.174509](https://doi.org/10.1103/PhysRevB.80.174509)
6. H. Guo, Y. Li, D. Urbina, B. Hu, R. Jin, **T. J. Liu**, D. Fobes, Z. Mao, E. W. Plummer, and

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- J. Zhang, "Doping and dimensionality effects on the core-level spectra of layered ruthenates", *Phys. Rev. B* **81**, 155121 (2010). [doi: 10.1103/PhysRevB.81.155121](https://doi.org/10.1103/PhysRevB.81.155121)
7. D. Fobes, **T. J. Liu**, Z. Qu, M. Zhou, J. Hooper, M. Salamon, and Z. Q. Mao, "Anisotropy of magnetoresistivities in $\text{Sr}_4\text{Ru}_3\text{O}_{10}$: Evidence for an orbital-selective metamagnetic transition", *Phys. Rev. B* **81**, 172402 (2010). [doi: 10.1103/PhysRevB.81.172402](https://doi.org/10.1103/PhysRevB.81.172402)
 8. Y. A. Ying, Y. Xin, B. W. Clouser, E. Hao, N. E. Staley, R. J. Myers, L. F. Allard, D. Fobes, **T. J. Liu**, Z. Q. Mao, and Y. Liu, "Suppression of Proximity Effect and the Enhancement of p-Wave Superconductivity in the Sr_2RuO_4 -Ru System", *Phys. Rev. Lett.* **103**, 247004 (2009). [doi: 10.1103/PhysRevLett.103.247004](https://doi.org/10.1103/PhysRevLett.103.247004)
 9. Z. Qu, J. Peng, **T. Liu**, D. Fobes, L. Spinu, and Z. Mao, "Complex electronic states in double-layered ruthenates ($\text{Sr}_{1-x}\text{Ca}_x$) $_3\text{Ru}_2\text{O}_7$ ", *Phys. Rev. B* **80**, 115130 (2009). [doi: 10.1103/PhysRevB.80.115130](https://doi.org/10.1103/PhysRevB.80.115130)
 10. B. Qian, Z. Qu, J. Peng, **T. Liu**, X. Wu, L. Spinu, and Z. Q. Mao, "Structural, magnetic, and electronic transport properties of ($\text{Sr}_{0.9}\text{Ca}_{0.1}$) $_3\text{Ru}_2\text{O}_7$ single crystal", *J. Appl. Phys.* **105**, 07E323 (2009); [doi: 10.1063/1.3074784](https://doi.org/10.1063/1.3074784)
 11. X. F. Xu, Z. A. Xu, **T. J. Liu**, D. Fobes, Z. Q. Mao, J. L. Luo, and Y. Liu, "Band-Dependent Normal-State Coherence in Sr_2RuO_4 : Evidence from Nernst Effect and Thermopower Measurements", *Phys. Rev. Lett.* **101**, 057002 (2008). [doi: 10.1103/PhysRevLett.101.057002](https://doi.org/10.1103/PhysRevLett.101.057002)
 12. Z. Qu, L. Spinu, H. Q. Yuan, V. Dobrosavljevic, W. Bao, J. W. Lynn, M. Nicklas, J. Peng, **T. J. Liu**, D. Fobes, E. Flesch, and Z. Q. Mao, "Unusual heavy-mass nearly ferromagnetic state with a surprisingly large Wilson ratio in the double layered ruthenates ($\text{Sr}_{1-x}\text{Ca}_x$) $_3\text{Ru}_2\text{O}_7$ ", *Phys. Rev. B* **78**, 180407(R) (2008). [doi: 10.1103/PhysRevB.78.180407](https://doi.org/10.1103/PhysRevB.78.180407)
 13. M. H. Fang, H. M. Pham, B. Qian, **T. J. Liu**, E. K. Vehstedt, Y. Liu, L. Spinu, and Z. Q. Mao, "Superconductivity close to magnetic instability in $\text{Fe}(\text{Se}_{1-x}\text{Te}_x)_{0.82}$ ", *Phys. Rev. B* **78**, 224503 (2008). [doi: 10.1103/PhysRevB.78.224503](https://doi.org/10.1103/PhysRevB.78.224503)
 14. J. Zhu, Z. Y. Pan, Y. X. Wang, Q. Wei, L. K. Zang, L. Zhou, **T. J. Liu**, and X. M. Jiang, "Surface diffusion of carbon atom and carbon dimer on Si(001) surface", *Appl. Surf. Sci.* **253**, 4586 (2007). [doi: 10.1016/j.apsusc.2006.10.029](https://doi.org/10.1016/j.apsusc.2006.10.029)
 15. Y. X. Wang, Z. Y. Pan, X. M. Jiang, J. Zhu, **T. J. Liu**, and L. Zhou, "Mechanical response of He clusters in bcc iron", Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms **255**, 57 (2007). [doi:10.1016/j.nimb.2006.11.011](https://doi.org/10.1016/j.nimb.2006.11.011)
 16. L. Zhou, Z. Y. Pan, Y. X. Wang, J. Zhu, **T. J. Liu** and X. M. Jiang, "Stable configurations of C_{20} and C_{28} encapsulated in single wall carbon nanotubes", *Nanotechnology* **17**, 1891 (2006). [doi: 10.1088/0957-4484/17/8/014](https://doi.org/10.1088/0957-4484/17/8/014)
 17. L. K. Zang, Y. X. Wang, Z. Y. Pan, L. Zhou, **T. J. Liu**, J. Zhu, and X. M. Jiang, "Ar-buffer-assisted deposition of Cu_{13} on Cu(111) surfaces", *Surf Sci* **600**, 527 (2006). [doi:10.1016/j.susc.2005.11.002](https://doi.org/10.1016/j.susc.2005.11.002)
 18. Y. X. Wang, Z. Y. Pan, **T. J. Liu**, X. M. Jiang, L. Zhou, and J. Zhu, "Anisotropic diffusion of Cu adatoms on strained Cu (111) surface", *Appl. Surf. Sci.* **253**, 1748 (2006). [doi:10.1016/j.apsusc.2006.03.007](https://doi.org/10.1016/j.apsusc.2006.03.007)
 19. **T. J. Liu**, Y. X. Wang, Z. Y. Pan, X. M. Jiang, L. Zhou, and J. Zhu, "Atomistic Simulation

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- of He Clustering and Defects Produced in Ni", *Chinese Physics Letters* **23**, 1261 (2006).
[doi: 10.1088/0256-307X/23/5/054](https://doi.org/10.1088/0256-307X/23/5/054)
20. L. K. Zang, Z. Y. Pan, Y. X. Wang, Q. Wei, L. Zhou, **T. J. Liu**, and Z. J. Li, "Structure character of copper clusters deposited on argon", *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* **228**, 16 (2005).
[doi:10.1016/j.nimb.2004.10.015](https://doi.org/10.1016/j.nimb.2004.10.015)