

TURAN BIROL

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EMPLOYMENT

- 2016 – Present** **Assistant Professor**
Department of Chemical Engineering and Materials Science
University of Minnesota, Minneapolis, MN, USA
- 2013 – 2016** **Post-Doctoral Associate**
Condensed Matter Theory Group
Rutgers University, Piscataway, NJ, USA

EDUCATION

- 2007 – 2013** **Doctor of Philosophy**
Department of Physics, Cornell University, Ithaca, NY, USA
Thesis Title: *“An ab initio Study of the Structural, Magnetic, and Electronic Properties of Transition Metal Oxides”*
Advisor: Craig J. Fennie
- 2005 – 2007** **Master of Science**
Department of Physics, Koc University, Istanbul, Turkey
Thesis Title: *“Thin Spectrum and Excitation Life Time in Atomic Bose-Einstein Condensates”*
Advisors: Ozgur E. Mustecaplioglu and Tekin Dereli
- 2001 – 2005** **Bachelor of Science**
Department of Physics, Middle East Technical University, Ankara, Turkey
- 2002 – 2005** **Certificate Minor**
Department of Philosophy, Middle East Technical University, Ankara, Turkey

HONORS AND AWARDS

- 2012** **William Nichols Findley Award for Exceptional Research Paper**
School of Applied and Engineering Physics, Cornell University
- 2011** **Best Theory Poster Award**
Workshop on the Fundamental Physics of Ferroelectrics and Related Materials NIST
Gaithersburg, MD, USA
- 2008** **Outstanding Teaching Assistant Award**
American Association of Physics Teachers

2008	Stephen and Margery Russell Distinguished Teaching Award Cornell University
2006	M.Sc. Scholarship Technical and Scientific Research Council of Turkey
2005	M.Sc. Scholarship Koc University
2002	Basic Sciences Undergraduate Scholarship Technical and Scientific Research Council of Turkey

PUBLICATIONS

28. S. Toth, B. Wehinger, K. Rolfs, **T. Birol**, U. Stuhr, H. Takatsu, K. Kimura, T. Kimura, and Ch. Regg, "Observation of Acoustic Electromagnons via Inelastic X-ray Scattering", Under Review
27. Bismayan Chakrabarti, **Turan Birol**, Kristjan Haule, "Role of Entropy and Structural Parameters in the Spin State Transition of LaCoO_3 ", Under Review
26. Greg Stone, Colin Ophus, **Turan Birol**, Jim Ciston, Che-Hui Lee, Ke Wang, Craig J. Fennie, Darrell G. Schlom, Nasim Alem, Venkatraman Gopalan, "*Atomic-Scale Imaging of Competing Ferroic States in a Ruddlesden-Popper Layered Oxide*", Under Review.
25. Judy G. Cherian, **Turan Birol**, Nathan C. Harms, Bin Gao, Sang-Wook Cheong, David Vanderbilt, Janice L. Musfeldt, "Optical Spectroscopy and Band Gap Analysis of Hybrid Improper Ferroelectric $\text{Ca}_3\text{Ti}_2\text{O}_7$ ", *Appl. Phys. Lett.* **108**, 262901 (2016).
24. Nicole A. Benedek, **Turan Birol**, "*Ferroelectric' Metals Reexamined: Fundamental Mechanisms and Design Considerations for New Materials*", *J. Mater. Chem. C* **4**, 4000 (2016).
23. Alex Wysocki, **Turan Birol**, "*Magnetically induced phonon splitting in ACr_2O_4 spinels from first principles*", *Phys. Rev. B* **93**, 134425 (2016).
22. Shan Jiang, Chang Liu, Huibo Cao, **Turan Birol**, Jared Allred, Wei Tian, Lian Liu, Kyuil Cho, Matthew Krogstad, Jie Ma, Keith Taddei, Makariy Tanatar, Moritz Hoesch, Ruslan Prozorov, Stephan Rosenkranz, Yasutomo Uemura, Gabriel Kotliar, Ni Ni, "*Structural and magnetic phase transitions in $\text{Ca}_{0.73}\text{La}_{0.27}\text{FeAs}_2$ with electron-overdoped FeAs layers*", *Phys. Rev. B* **93**, 054522 (2016).
21. Kristjan Haule, **Turan Birol**, "*Free energy from stationary implementation of the DFT+DMFT functional*", *Phys. Rev. Lett.* **115**, 256402 (2015).
20. Chuck-Hou Yee, **Turan Birol**, Gabriel Kotliar, "*Guided design of copper oxysulfide superconductors*", *Europhysics Letters* **111**, 17002 (2015).
19. Michael Valentine, Seyed Koochpayeh, Martin Mourigal, Tyrel M. McQueen, Collin Broholm, Natalia Drichko, Sian Dutton, Robert J. Cava, **Turan Birol**, Hena Das, Craig J. Fennie, "*Raman study of magnetic excitations and magneto-elastic coupling in $\alpha\text{-SrCr}_2\text{O}_4$* ", *Phys. Rev. B* **91**, 144411 (2015).
18. **Turan Birol**, Kristjan Haule, " *$J_{eff}=1/2$ Mott-Insulating State in Ir and Rh Fluorides*", *Phys. Rev. Lett.* **114**, 096403 (2015).

17. G.L. Pascut, **T. Birol**, M.J. Gutmann, J.J. Yang, S.-W. Cheong, K. Haule, and V. Kiryukhin, “A series of alternating states with unpolarized and spin-polarized bands in dimerized $IrTe_2$ ”, Phys. Rev. B **90**, 195122 (2014).
16. Veronica Goian, Stanislav Kamba, Nathan Orloff, **Turan Birol**, Che Hui Lee, Dmitry Nuzhnyy, James C. Booth, Margitta Bernhagen, Reinhard Uecker, Darrell G. Schlom, “Influence of central mode and soft phonon on microwave dielectric loss near strain-induced ferroelectric phase transitions in $Sr_{n+1}Ti_nO_{3n+1}$ ”, Phys. Rev. B **90**, 174105 (2014).
15. Kristijan Haule, **Turan Birol**, Gabriel Kotliar, “Covalency in transition metal oxides within all-electron Dynamical Mean Field Theory”, Phys. Rev. B **90**, 075136 (2014).
14. G.L. Pascut, K. Haule, M.J. Gutmann, S.A. Barnett, A. Bombardi, S. Artyukhin, **T. Birol**, D. Vanderbilt, J.J. Yang, S.-W. Cheong, V. Kiryukhin, “Dimerization-Induced Cross-Layer Quasi-Two-Dimensionality in Metallic Iridate $IrTe_2$ ”, Phys. Rev. Lett. **112**, 086402 (2014).
13. K. E. Arpino, D. C. Wallace, Y. F. Nie, **T. Birol**, P. D. C. King, S. Chatterjee, M. Uchida, S. M. Koohpayeh, J.-J. Wen, C. J. Fennie, K. M. Shen, T. M. McQueen, “Topological Surface States and Superconductivity in $[Tl_4](Tl_{1-x}Sn_x)Te_3$ Perovskites”, Phys. Rev. Lett. **112**, 017002 (2014).
12. X. Ke, **T. Birol**, R. Misra, J.-H. Lee, B. Kirby, D.G. Schlom, C.J. Fennie, J.W. Freeland, “Structural control of magnetic anisotropy in a strain driven multiferroic $EuTiO_3$ thin film”, Phys. Rev. B **88**, 094434 (2013).
11. **Turan Birol**, Craig J. Fennie, “Origin of giant spin-lattice coupling and the suppression of ferroelectricity in $EuTiO_3$ from first principles”, Phys. Rev. B **88**, 094103 (2013).
10. Che-Hui Lee*, Nathan D. Orloff*, **Turan Birol***, Ye Zhu, Veronica Goian, Ryan Haislmaier, Eftihia Vlahos, Julia A. Mundy, Yuefeng Nie, Michael D. Biegalski, Jingshu Zhang, Margitta Bernhagen, Nicole A. Benedek, Yongsam Kim, Joel D. Brock, Reinhard Uecker, X. X. Xi, Lena F. Kourkoutis, Venkatraman Gopalan, Dmitry Nuzhnyy, Stanislav Kamba, David A. Muller, Ichiro Takeuchi, James C. Booth, Craig J. Fennie, Darrell G. Schlom, “Exploiting Dimensionality and Defect Mitigation to Create Tunable Microwave Dielectrics”, Nature **502**, 532 (2013). (*Equal Contribution)
9. A. Melville, T. Mairoser, A. Schmehl, **T. Birol**, T. Heeg, B. Hollaender, J. Schubert, C. J. Fennie, D. G. Schlom, “Effect of Film Thickness and Biaxial Strain on the Curie Temperature of EuO ”, Appl. Phys. Lett. **102**, 062404 (2013).
8. P. J. Ryan, J. -W. Kim, **T. Birol**, P. Thompson, J. -H. Lee, X. Ke, P. S. Normile, E. Karapetrova, P. Schiffer, S. D. Brown, C. J. Fennie, D. G. Schlom, “Reversible Control of Magnetic Interactions by Electric Field in a Single Phase Material”, Nat. Comm. **4**, 1334 (2013)
7. **Turan Birol***, Nicole A. Benedek*, Hena Das, Aleksander L. Wysocki, Andrew T. Mulder, Brian M. Abbott, Eva H. Smith, Saurabh Ghosh, Craig J. Fennie, “The Magnetoelectric Effect in Transition Metal Oxides: Insights and the Rational Design of New Materials from First Principles”, Current Opinion in Solid State and Materials Science **16**, 227 (2012). (Invited Paper) (*Equal Contribution)
6. S. Kamba, V. Goian, M. Orlita, D. Nuzhnyy, J.H. Lee, D.G. Schlom, K. Rushchanskii, M. Lezaic, **T. Birol**, C.J. Fennie, P. Gemeiner, B. Dkhil, V. Bovtun, M. Kempa, J. Hlinka, J. Petzelt, “Magnetodielectric coupling and phonon properties of compressively strained $EuTiO_3$ thin films deposited on LSAT”, Phys. Rev. B **85**, 094435 (2012).

5. **Turan Birol**, Nicole A. Benedek, Craig J. Fennie, “*Interface control of emergent ferroic order in Ruddlesden-Popper $Sr_{n+1}Ti_nO_{3n+1}$* ”, Phys. Rev. Lett. **107**, 257602 (2011). (Editor’s Suggestion)
4. **Turan Birol**, Ozgur Esat Mustecaplioglu, “*Phase Diffusion of a q-Deformed Oscillator*”, Invited Paper, Symmetry **1**, 240-251 (2009).
3. **Turan Birol**, Piet W. Brouwer, “*Spin torque from tunneling through impurities in a magnetic tunnel junction*”, Phys. Rev. B **80**, 014434 (2009).
2. **Turan Birol**, Ozgur Esat Mustecaplioglu, “*Effects of zero mode and thin spectrum on the life time of atomic Bose Einstein condensates*”, European Physical Journal - Special Topics **160**, 11-22 (2008).
1. **Turan Birol**, Tekin Dereli, Ozgur Esat Mustecaplioglu, Li You, “*Coherence lifetimes of excitations in an atomic condensate due to the thin spectrum*”, Phys. Rev. A **76**, 043616 (2007).

PRESENTATIONS

Invited talks:

- 2014 “*Materials by Design From Ferroelectrics to Spin-Orbit Coupled Mott Insulators*”, Binghamton University, Binghamton, NY, USA.
- 2014 “*Materials by Design – Ferroelectricity in Sr-Ti-O Layered Perovskites*”, Koc University, Istanbul, Turkey.
- 2014 “*A new class of $J_{eff} = 1/2$ Mott Insulators*”, METU Physics Department, Ankara, Turkey.
- 2014 “*Ferroelectricity in Sr-Ti-O layered perovskites*”, UNAM, Bilkent University, Ankara, Turkey.
- 2014 “*First Principles Design of Ferroelectrics and Multiferroics*”, Tutorial in IEEE Joint ISAF, IWATMD, and PFM Symposium, State College, PA, USA.
- 2014 “*Materials by Design – Ferroelectricity in Sr-Ti-O Layered Perovskites*”, METU Physics Department, Ankara, Turkey.
- 2013 “*Ferroelectrics and multiferroics by design*”, Tutorial in IEEE Joint UFFC, EFTF, and PFM Symposium, Prague, Czech Republic.

Contributed talks:

- 2015 “*A New Class of $J_{eff} = 1/2$ Mott Insulators*”, APS March Meeting, San Antonio, TX, USA.
- 2013 “*Spin-phonon coupling in magnetoelectric $EuTiO_3$* ”, COST Workshop on Advances in Ferroelectrics and Multiferroics, Prague, Czech Republic.
- 2013 “*Spin-Lattice Coupling and Third Neighbor Magnetic Interactions in $EuTiO_3$* ”, APS March Meeting, Baltimore, MD, USA.
- 2013 “*Spin-phonon and spin-lattice coupling in magnetoelectric $EuTiO_3$* ”, Fundamental Physics of Ferroelectrics and Related Materials Workshop, Ames, IA, USA.
- 2012 “*Interface control of emergent ferroic order in Ruddlesden-Popper $Sr_{n+1}Ti_nO_{3n+1}$* ”, APS March Meeting, Boston, MA, USA.

- 2011 “*Magnetoelectric coupling in layered perovskites from first principles*”, APS March Meeting, Dallas, TX, USA.
- 2010 “*Ferroic coupling in Sr-Ti-O layered perovskites from first principles*”, APS March Meeting, Portland, OR, USA.
- 2009 “*Spin Transfer Torque From Tunneling Through Impurities in a Magnetic Tunnel Junction*”, APS March Meeting, Pittsburgh, PA, USA.
- 2007 “*Thin Spectrum and Decoherence of Atomic Bose-Einstein Condensates*”, Central European Workshop for Quantum Optics, Palermo, Italy.
- 2007 “*Thin Spectrum and Decoherence of Atomic Bose-Einstein Condensates*”, Workshop on Quantization, Dualities & Integrable Systems VI, Middle East Technical University, Ankara, Turkey.

TEACHING

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| 2008 & 2009 | TA Training Workshop Facilitator
Cornell University Department of Physics |
| 2007 – 2009 | Teaching Assistant
Cornell University Department of Physics |
| 2007 | High School Teaching
Koc University Volunteers’ Club |
| 2005 – 2007 | Teaching Assistant
Koc University Department of Physics |