

BIOGRAPHICAL SKETCH

Jak Chakhalian

Department of Physics and Astronomy, Rutgers University, e-Mail: jak.chakhalian@rutgers.edu, Tel: +1-479-856-4051, Web: <http://quantum.rutgers.edu>

(a) Education and Training

The University of British Columbia, Vancouver, Canada; Physics & Astronomy; M.Sc., 1996
The University of British Columbia, Vancouver, Canada; Physics & Astronomy; Ph.D., 2002
TRIUMF, National Canadian Research Centre, Vancouver, Canada; Postdoctoral Fellow, 2002–2003
Max Planck Institute for Solid State Research, Stuttgart, Germany; Max Planck Fellow, 2004–2006
Max Planck Institute for Solid State Research, Stuttgart, Germany; Visiting Professor, Summer 2006, August 2007&2008
CNRS, Neel Institute, Grenoble, France; Visiting Professor, Summer 2009 and 2010
Nanyang Technological University, Singapore; Visiting Professor, Fall 2012–Spring 2013
Institute of Physics, Chinese Academy of Sciences, Beijing, China; Visiting Professor, Summer 2014 – 2018

(b) Research and Professional Experience

2016–present: **Claud Lovelace Endowed Professor of Physics**, Rutgers University, Piscataway, NJ
2012–2016: **Charles and Clydene Scharlau Endowed Chair and Professor of Physics**, University of Arkansas, Fayetteville, AR
2010–2012: **Charles and Clydene Scharlau Endowed Chair and and Associate Professor of Physics**, University of Arkansas, Fayetteville, AR
2006–2010: **Assistant Professor**, University of Arkansas, Fayetteville, AR

(c) Products

1. Middey S., Meyers D., Kareev M., Cao Y., Liu X., Shafer P., Freeland J. W., Kim J. M., Ryan P. J., and **Chakhalian J.**, Disentangled cooperative orderings in artificial rare-earth nickelates, *Phys. Rev. Lett.* (2018). (Listed as the result of the year at Advanced Light Source, Berkley Lab and DOE)
2. Cao Y., Wang Z., Park S., Yuan Y., Liu X., Nikitin S., Akamatsu H., Kareev M., Middey S., Meyers D., Thompson P., Ryan P. J., Shafer P., N'Diaye A., Arenholz E., Goplan V., Zhu Y., Rabe K., and **Chakhalian J.**, Artificial two-dimensional polar metal at room temperature, *Nat. Commun.* (2018). ('Editor's Choice')
3. Liu X., Middey S., Cao Y., Kareev M., and **Chakhalian J.**, Geometrical lattice engineering of complex oxide heterostructures: a designer approach to emergent quantum states. *MRS Communications Review* (2016).
4. Middey S., **Chakhalian J.**, Mahadevan P., Freeland J. W., Millis A. J., and Sarma D. D., Ultra-thin films and heterostructures of rare earth nickelates, *Annual Review of Materials Research*, 46, (2016).
5. Middey S., Meyers D., Doenning D., Kareev M., Liu X., Cao Y., Yang Z., Shi J., Gu L., Ryan P., Pentcheva R., Freeland J. W., and **Chakhalian J.**, Mott electrons in an artificial graphene-like crystal of rare-earth nickelate, *Phys. Rev. Lett.* 116, 056801 (2016). ('Editor Suggestions')

-
6. Cao Y., Liu X., Kareev M., Choudhury D., Middey S., Meyers D., Kim J. M., Ryan P. J., Freeland J. W., and **Chakhalian J.**, Engineered Mott ground state in $\text{LaTiO}_{3+\delta}/\text{LaNiO}_3$ heterostructure, *Nat. Commun.* 7, 10418 (2016).
 7. Cao Y., Yang Z., Kareev M., Liu X., Meyers D., Middey S., Choudhury D., Shafer P., Guo J., Freeland J. W., Arenholz E., Gu L., and **Chakhalian J.**, Magnetic interactions at the nanoscale in trilayer titanates, *Phys. Rev. Lett.* 116, 076802 (2016).
 8. **Chakhalian J.**, Freeland J. W., Mills A., Panagopoulos C., Rondinelli J., Colloquium: Emergent properties in plane view: Strong correlations at oxide interfaces, *Rev. Mod. Phys.* 86, 1189 (2014).
 9. Meyers D., Middey S., Cheng J. G., Mukherjee S., Gray B., Cao Y., Zhou J. S., Goodenough J. B., Choi Y., Haskel D., Freeland J. W. Saha-Dasgupta T., and **Chakhalian J.**, Competition between heavy fermion and Kondo interaction in isoelectronic A-site-ordered perovskites, *Nat. Commun.* 5, 5818 (2014).
 10. Liu J., Kargarian M., Kareev M., Gray B., Ryan P. J., Cruz A., Tahir N., Chuang Y., Guo J., Rondinelli M., Freeland J. W., Fiete G., and **Chakhalian J.**, Heterointerface engineered electronic and magnetic phases of NdNiO_3 thin films, *Nat. Commun.* 4, 2714 (2013).
 11. **Chakhalian J.**, Millis A. J., Rondinelli J., Whither the oxide interface, *Nature Mater.* 11, 92-94 (2012).

(d) Synergistic Activities

1. Conference service:

(i) Chair: 'Workshop on Magnetism and Spintronics', Berkeley, CA, January 21–23, 2018. (ii) Chair: 'Collaborative Conference on Materials Research', Jeju, S. Korea, June 25–29, 2017. (iii) Chair: 'Workshop on strongly correlated phenomena in low-dimensional heterostructures', Beijing, China, June 9–11, 2017. (iv) co-Organizer and Chair for conference: '76th Annual Physical Electronics Conference', Fayetteville, AR, June 20-23, 2016. (v) co-Founder, co-Organizer, and Chair: 'International Conference on Quantum Materials Synthesis', New York, NY, August 29–September 3, 2016.

2. **University service:** (i) co-Chair of The Initiative for Materials Research at Rutgers University -IMR@RU, 2018-ongoing. (ii) co-Director of the Center for Quantum Materials Synthesis at Rutgers (cQMS), 2017-ongoing. (iii) Member of project selection committee for cQMS, 2017-present. (iv) Member of the Awards selection committee for ICAM-I2CAM, Institute for Complex Adaptive Matter-Moore foundation, 2018-present.

3. **Community service:** (i) Member of the Advanced Light Source cross-cutting review, Berkeley, CA, Jan. 2018. (ii) Developed 'Kool Matter' - a program about materials for broad audience, delivered annually since 2012-present. (iii) co-Organizer of a public lecture by Nobel prize laureate Shuji Nakamura (2017).

4. **Mentoring:** (i) Mentoring summer NSF REU students, continuously since 2014–present. (ii) Mentoring high-school summer students in cooperation with Liberty Science Center, Jersey City, New Jersey (2018).

5. **Teaching:** Lecturer at Fundamentals of Quantum Materials Winter School, Univ. of Maryland U, College Park, MD (2018).

6. **Invited speaker talks and seminars:** (i) Conference on the new directions in strongly correlated materials, Dresden, Germany (2018). (ii) Invited seminar speaker, Paul Scherrer

Institute, Zurich, Swiss (2018) (iii) Invited seminar speaker, ETH Zurich, Swiss (2018). (ii) International symposium on "Low dimensional quantum materials", Beijing, China (2018), invited seminar speaker, Ningbo Institute of Materials Tech., Ningbo, China (2018) and invited seminar speaker, Tsinghua University, Beijing, China (2018). (iii) Conference on Quantum Materials Synthesis, Shanghai, China (2018). (iv) Workshop on New Directions in Quantum Materials Research, College Park, MD (2018). (v) 'Geometrical engineering of interacting topological phases', Invited speaker at the APS March Meeting, San Antonio (2015). (vi) 'Correlated oxide interfaces', Invited speaker, Magnetism'14, Hawaii. (iii) 'Complex electronic interfaces: State of the art', Keynote speaker, International symposium on low dimensional materials, IOP CAS, Beijing (2015).

7. Awards: (i) Moore foundation award for Center for Quantum Materials Award at Rutgers - cQMS, 2017. (ii) QuantEmX Exchange Awards - 2018, 2019. (iii) Gordon and Betty Moore foundation award - EPIqS investigator in quantum materials, 2015. (iv) International Award of Indo-USA Technology Forum (2014-2016).

8. Awards to directed by the PI students: (i) Derek Meiers - Sigma Xi Research Society outstanding publication Award, 2014. (ii) Benjamin Gray - Nottingham Prize, 2013. (iii) Jian Liu - American Physics Society the Iris Ovshinsky Award, 2011.

(e) Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers

Collaborators in the last 48 months: Averitt (UC San Diego), D. Basov (Columbia), L. J. Brillson (Ohio State), TeYu Chien (Argonne), J. L. Cohn (U. Florida), G. Fiete (UT Austin), J. Freeland (Argonne), L. F. Kourkoutis (Cornell), A. Millis (Columbia), D. Muller (Cornell), J. Rondinelli (Northwestern), P. Ryan (Argonne), M. Upton (Argonne), Min Xiao (University of Arkansas), Jianshi Zhou (UT Austin)

Co-editors in the last 24 months: None

Graduate and Postdoctoral Advisors: Graduate Advisor: Robert Kiefl, *University of British Columbia, Vancouver, Canada* Post-doctoral Advisor: Jess Brewer, *TRIUMF, Centre for Condensed Matter, Canada* Post-doctoral Advisor: Bernhard Keimer, *Max Planck Institute for Solid State Research, Germany*

Graduate and Postdoctoral Advisees: Graduate: Fengdi Wen (Rutgers), Xiaoran Liu (Rutgers), A. Kareev (U. of Arkansas), D. Meyers (DOE-BNL), Jian Liu (U. of Tennessee), B. Gray (U of North Carolina); Postdoctoral: Yanwei Cao (IOP CAS, China), Chowdhury Debraj (U. of Arkansas), Eun Ju Moon (Missouri State U), M. Kareev (Rutgers), Srimanta Middey (IIST Bangalore, India), Banabir Pal (Rutgers). Total graduate students: 6; Total postgraduate scholars: 6.