

# Curriculum Vitae

## Mohammad H. Hamidian

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### Education:

Ph.D. (Physics)	Cornell University	2011
M.Sc (Physics)	Cornell University	2010
M.Sc (Physics)	University of Toronto	2005
B.A.Sc. (Engineering Science)	University of Toronto	2004

### Research:

• Assistant Professor	University of California, Davis	2016-Present
• Research Associate	Harvard University	2015-present
• Visiting Fellow	Cornell University	2015-present
• Research Associate	Cornell University	2014-2015
• Post-doctoral Associate	Cornell University	2011-2014
• Graduate Research Assistant	Cornell University	2005-2011
• Graduate Research Assistant	University of Toronto	2004-2005
• Undergraduate Research Assistant	University of Toronto	2003
• IBM Development Support	IBM Software Lab - Toronto	2001-2002

### Teaching:

• Teaching Assistant Trainer	Cornell University	2006-2008
• Teaching Asst - Electromagnetism	Cornell University	2006
• Teaching Asst - Physics of Music	Cornell University	2005
• Teaching Asst - Mechanics	Cornell University	2005
• Teaching Asst - Physics Lab	University of Toronto	2004-2005
• Teaching Asst - Calculus/Algebra	University of Toronto	2000-2004

### Leadership:

• Graduate Society (Budget Chair)	Cornell University	2008-2009
• Physics Student Society (President)	Cornell University	2007-2008
• Physics Student Society (President)	University of Toronto	2004-2005
• Engineering Science Union (President)	University of Toronto	2003-2004

### Honors and Awards:

• Lee-Osheroff-Richardson Science Prize	Oxford Instruments	2016
• Feynman Prize	Cornell University	2005
• Top Leaders Award	University of Toronto	2004
• Top Union President for Engineering	University of Toronto	2004

### Invited Talks (Conferences/Workshops):

- “Directly Visualizing the Super States of Nature: Discovery of the Cuprate Pair Density Wave”  
Workshop on Strong Correlations and Normal State of the High Temperature Superconductors  
Dresden, Germany 2016
- “New Visualization Techniques for Cuprate High Temperature Superconductors”.  
CIFAR Quantum Materials Program Meeting  
Montreal, Canada 2015
- “Phase Resolved Characterization the Cuprate *d*-Form Factor Density Wave with SI-STM”  
X-Ray Science Gordon Conference  
Easton, USA 2015
- “Atomic Scale Phase Sensitive Detection Methods for Broken Symmetries in the Cuprates”.  
International Symposium on Frontiers of Superconductivity Research.  
Chinese Academy of Sciences, China 2014
- “Direct Phase-Resolved Visualization of the *d*-Form Factor Density Wave in Underdoped Cuprates”.  
Mesoscale Science Frontiers Annual Conference.  
Santa Fe, New Mexico 2014
- “Imaging Electronic Structure: Lectures in Spectroscopic Imaging STM”.  
Canadian Institute For Advanced Study (CIFAR), Quantum Materials Division, Summer School  
Vancouver, Canada 2013
- “Visualizing Individual Kondo Holes: Textures in the Pond of Strong Correlations”.  
Dual Nature of *f*-electrons Workshop  
Himeji, Japan 2012
- “Fundamental Heavy Fermion Physics Revealed with Spectroscopic Imaging STM”.  
Conference on Quantum Matter from the Nano- to the Macroscale  
Dresden, Germany 2012
- “Imaging the Realm of the Strongly Correlated: From Heavy Fermions to High-Temperature  
Superconductivity”.  
Center for Emergent Superconductivity Workshop  
University of Illinois, Urbana-Champaign 2011
- “Visualizing the Formation of Heavy Fermions and the Impact of Kondo Holes”  
Nordic Conference on Correlated Electron Systems,  
Uppsala, Sweden 2011
- “Visualizing the Formation of Heavy Fermions and the Impact of Kondo Holes”  
Superconductivity: 100 Years Young, Workshop (Invited),  
IIP-Federal University of Rio Grande do Norte, Natal, Brazil 2011
- “Imaging the Fano Lattice to Hidden Order Transition in URu<sub>2</sub>Si<sub>2</sub>”  
(Substitution for J.C. Davis)  
ICTP Workshop on Principles and Design of Strongly Correlated Electronic Systems Trieste, Italy  
2010

- “Imaging the Fano Lattice to Hidden Order Transition in URu<sub>2</sub>Si<sub>2</sub>”  
4-Corners of Southwest Ontario Workshop ,  
Perimeter Institute, Waterloo, Ontario, Canada 2010

**Invited Talks (Seminars):**

- “Visualizing Topologically Induced Dirac States of a Kondo Insulator”  
University of Maryland, Condensed Matter Seminar  
College Park, Maryland 2016
- “Directly Visualizing the Super States of Nature”  
University of Texas A&M, Condensed Matter Seminar  
College Station, Texas 2016
- “Directly Visualizing the Super States of Nature”  
Carnegie Mellon University, Condensed Matter Seminar  
Pittsburg, Pennsylvania 2016
- “Cooper Pair Condensate Visualization: Discovery of the Cuprate Pair Density Wave”  
Caltech, Condensed Matter Seminar  
Pasadena, California 2016
- “Directly Visualizing the Super States of Nature: Discovery of the Cuprate Pair Density Wave”  
UC Davis, Physics Colloquium  
Davis, California 2016
- “Cooper Pair Condensate Visualization: Discovery of the Cuprate Pair Density Wave”  
UCSD, Condensed Matter Seminar  
La Jolla, California 2016
- “New Visualization Techniques for Cuprate High Temperature Superconductors”.  
Université Paris Sud, Condensed Matter Seminar  
Paris, France 2015
- “Detection of Pair Density Wave State in Cuprate High Temperature Superconductors”.  
Max Planck Institute, Condensed Matter Seminar  
Dresden, Germany 2015
- “Detection of Pair Density Wave State in Cuprate High Temperature Superconductors”.  
Leiden University, Condensed Matter Seminar  
Leiden, Netherlands 2015
- “Detection of Pair Density Wave State in Cuprate High Temperature Superconductors”.  
Max Planck Institute, Condensed Matter Seminar  
Stuttgart, Germany 2015
- “Imaging the Conflict Between *d*-symmetry Cooper-Pairs and *d*-Form Factor Density Waves in Underdoped Cuprates”.  
Condensed Matter Seminar,  
Rutgers University, USA 2015

- “Imaging the Conflict Between  $d$ -symmetry Cooper-Pairs and  $d$ -Form Factor Density Waves in Underdoped Cuprates”.  
Condensed Matter Seminar,  
Academia Sinica, Taiwan 2014
- “Direct Phase-Resolved Visualization of the Enhancement of  $d$ -Form Factor Density Wave in Cuprates Through Superconducting Vortex Cores”.  
Condensed Matter Seminar  
University of Waterloo, Canada 2014
- “Visualizing the Formation of Heavy Fermions and their Destruction by Kondo Holes”  
Condensed Matter Seminar  
University of Toronto, Canada 2012
- “Visualizing the Formation of Heavy Fermions and the Impact of Kondo Holes”  
General Colloquium  
University of Illinois at Chicago, Chicago, U.S.A. 2011
- “Imaging the Fano Lattice to Hidden Order Transition in URu<sub>2</sub>Si<sub>2</sub>”  
Condensed Matter Seminar,  
Stanford University, Stanford, California, U.S.A. 2010
- “Imaging the Fano Lattice to Hidden Order Transition in URu<sub>2</sub>Si<sub>2</sub>”  
Condensed Matter Seminar  
McMaster University, Hamilton, Ontario, Canada 2010
- “Imaging the Fano Lattice to Hidden Order Transition in URu<sub>2</sub>Si<sub>2</sub>”  
Condensed Matter Seminar,  
Rutgers University, Piscataway, New Jersey, U.S.A. 2010

### **Publications:**

“Visualizing Topologically induced Dirac Surface States in the Heavy Fermion Insulator SmB<sub>6</sub>”. H. Pirie, Yang He, M.M. Yee, A. Soumyanarayanan, Dae-Jeong Kim, Z. Fisk, D.K. Morr, Jennifer E. Hoffman, **M. H. Hamidian**. (*In preparation 2016*).

“Universality of Commensurate 4a<sub>0</sub>-period Charge Density Modulations Throughout the Cuprate Pseudogap Regime”. A. Mesaros, K. Fujita, Stephen Edkins, **M. H. Hamidian**, H. Eisaki, S. Uchida, J.C. Davis, M. J. Lawler, Eun-Ah Kim, (*PNAS 2016*)

“Detection of a Cooper-Pair Density Wave in Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8</sub>”. **M. H. Hamidian\***, S. D. Edkins\*, Sang Hyun Joo\*, A. Kostin, H. Eisaki, S. Uchida, M. J. Lawler, E.-A. Kim, A. P. Mackenzie, K. Fujita, Jinho Lee, J. C. Davis. *Nature* **532**, 343 (2016)

“Visualizing the Unidirectional, Commensurate,  $d$ -Symmetry Density Wave State Induced by High Fields in Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8</sub>”. S.D. Edkins, K. Fujita, A. Mesaros, Andrey Kostin, H. Eisaki, S. Uchida, M.J. Lawler, E.-A. Kim, Subir. Sachdev, J.C. Davis, **M.H. Hamidian**. (*Under Review*)

“Atomic-scale Electronic Structure of the Cuprate  $d$ -symmetry Form Factor Density Wave State”. **M.H. Hamidian\***, S.D. Edkins\*, Chung Koo Kim, Takagi, H. Eisaki, S. Uchida, M.J. Lawler, E.-A. Kim, Subir Sachdev, J.C. Davis, K. Fujita. *Nature Physics*, **12**, 150 (2016)

“Visualizing Heavy Fermions and their Cooper Pairing”. **M.H. Hamidian**, J. van Dyke, A. Kostin, D. Morr, J.C. Davis. **Invited paper** for *Report on the Progress of Physics. In preparation* (2017)

“Direct phase-sensitive identification of a *d*-form factor density wave in underdoped cuprates”. K. Fujita\*, **M.H. Hamidian**\*, S.D. Edkins, Chung Koo Kim, Y. Kohsaka, M. Azuma, M. Takano, H. Takagi, H. Eisaki, S. Uchida, A. Allais, M.J. Lawler, E.-A. Kim, Subir Sachdev, J.C. Davis. *PNAS*, **111**, E3026 (2014).

“Simultaneous Transitions in Cuprate Momentum-Space Topology and Electronic Symmetry Breaking”. K. Fujita, C.K. Kim, I. Lee, Jinho Lee, **M.H. Hamidian**, I. Firmo, S. Mukhopadhyay, H. Eisaki, S. Uchida, M.J. Lawler, E.A. Kim, J.C. Davis. *Science*, **344**, 612-616, (2014).

“Spectroscopic Imaging STM: Atomic-scale Visualization of Electronic Structure and Symmetry in Underdoped Cuprates”. K. Fujita, **M.H. Hamidian**, I. Firmo, S. Mukopadhayah, C-K. Kim, H. Eisaki, S. Uchida, J.C. Davis. Book Chapter in *Experimental Methods for Strongly Correlated Systems*, Springer (2014).

“Phase Determination in Intra-unit-cell Fourier Transform STM – Picometer Registration of Zn Impurity States in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ ”. **M.H. Hamidian**\*, I. Firmo\*, K. Fujita, S. Mukopadhayah, J.C. Davis, H. Eisaki, S. Uchida, M.J. Lawler, E.-A. Kim, J.W. Orenstein. *New J. Phys.* **14** 053017 (2012).

“How Kondo Holes Create Intense Nanoscale Heavy Fermion Hybridization Disorder”. **M.H. Hamidian**\*, A.R. Schmidt\*, I. Firmo, P. Bradley M. P. Allen, J.D. Garrett, T.J. Williams, G.M. Luke, Y. Dubi, A.V. Balatsky & J.C. Davis. *PNAS*, **108**, 18233 (2011).

“Imaging the Fano Lattice to ‘Hidden Order’ Transition in  $\text{URu}_2\text{Si}_2$ ”. A.R. Schmidt, **M.H. Hamidian**, P. Wahl, F. Meier, A.V. Balatsky, J.D. Garrett, T.J. Williams, G.M. Luke & J.C. Davis. *Nature* **465** 570-576 (2010).

\* - indicates equal contribution to publication

### **Services:**

Referee for *Nature Comm.*, *Science Advances*, *PRX*, *Physical Review Letters*, *Physical Review B* 2011-present

Referee for NSF CAREER Program 2014-present

Referee for NSF Condensed Matter Physics (CMP) Program 2014-present

### **Theses:**

“Imaging the Realm of the Strongly Correlated: Visualizing Heavy Fermion Formation and the Impact of Kondo Holes”. Ph.D. Thesis, Cornell University (2011)

“A Solitary Wave Theory for the El-Nino-Southern Oscillation”. Master’s Thesis, University of Toronto (2005).

“Solving Quantum Dynamical Problems through Representations of Lie Algebras”. Undergraduate Thesis, University of Toronto (2004).