

Yashar Komijani - Curriculum Vitae

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Citizen of Iran, holder of the US Green Card

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Education and research experience:

- 2020 – now **Assistant Professor** – Dept. of Physics - University of Cincinnati
- 2015 – 2020 **Quantum Materials Theory Group Postdoctoral Fellow** - Rutgers University, *Theoretical Condensed matter physics* with Prof. Piers Coleman, Prof. Gabriel Kotliar and Prof. Natan Andrei.
- 2012 – 2015 **Postdoctoral Fellow:** Univ. British Columbia, *Theoretical Condensed Matter physics* with Prof. Ian Affleck.
- 2006 – 2011 **PhD:** Eidgenössische Technische Hochschule (ETH) Zurich, Switzerland, Dept. of Solid State Physics, Project: *Transport experiments on p-GaAs quantum dots and point contacts*, Supervisor: Prof. Klaus Ensslin
- 2003 – 2006 **MSc:** University of Tehran, Electrical/Communication Engineering Dept., Project: *Fabrication of 2D and 3D Photonic Crystals*, Supervisors: Prof. Shams Mohajerzadeh and Prof. M. Shahabadi
- 1998 – 2003 **BSc:** University of Tehran, Electrical/Communication Engineering Dept., Project: *Improving TCP Performance over Wireless Links*, Supervisor: Prof. Reza Faraji Dana

Qualifications:

Two postdocs in theoretical and one PhD in experimental condensed matter physics

Current Research Interests: Strongly correlated electronic systems

1. Quantum Criticality & High- T_c Superconductivity in Heavy fermions & Spin liquids
 2. Realizations of Topological Quantum Computation
 3. Luttinger liquids, Quantum Impurities and Coupled wire constructions
 4. Quantum transport in Mesoscopic systems and Superconducting circuits
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References:

Prof. Piers Coleman (coleman@physics.rutgers.edu) – Postdoc supervisor – Rutgers
Prof. Ian Affleck (iaffleck@phas.ubc.ca) – Postdoc supervisor – UBC Vancouver
Prof. Frank Steglich (steglich@cpfs.mpg.de) – Collaborator – MPI CPFS Dresden
Prof. Klaus Ensslin (ensslin@phys.ethz.ch) – PhD advisor – ETH Zurich
Prof. Gabriel Kotliar (kotliar@physics.rutgers.edu) – Postdoc supervisor – Rutgers
Prof. Natan Andrei (natan@physics.rutgers.edu) – Postdoc supervisor – Rutgers

Open-source codes:

HFSolver: www.physics.rutgers.edu/~komijani/hfsolver.html

The first heavy-fermion simulator for quantum criticality

Scientific referee for the journal papers:

Science

American Physics Society: Physics Review Letters and Physics Review B

Journal of Low temperature Physics

Wiley, Physics Status Solidi (b)

Elsevier, Physics Letters A

PhD Students that I helped/supervised:

Ari Wugalter (2016-2020) – Rutgers Univ.

Zheng Shi (2012-2015), - Univ. of British Columbia

Fabrizio Nichele (2010-2011) – ETH Zurich

Academic Honors/Awards:

Max Planck – UBC Fellowship for postdoctoral studies (2013, 2014)

Swiss National Science Foundation Fellowship for postdoctoral studies (2012)

Kharazmi's 10 top invention prize (1998)

Teaching & Employment Experience:

03.2007 – 06.2011 ETH Zurich – Physics Lab. Praktikum Assistant
Hall Effect, Quantum Hall Effect, Elect. Conductivity

10.2006 – 02.2007 ETH Zurich - Teaching Assistant
Semiconductor Nanostructures, Prof. Thomas Ihn

04.2002 – 07.2004 Ashna Net Imen, Co. & Univ. of Tehran Information Center
Network Traffic & QoS Engineering, Product Testing

05.2000 – 09.2002 Andisheh Negar, Co. Tehran, Iran
LAN/Wireless/VoIP Networks Design & Implement

List of invited presentations:

Multichannel Kondo anyons for topological quantum computation

Perimeter Institute (Jan. 2020)

Colloquium: Quantum materials in the age of entanglement

University of Alberta (Jan. 2020), University of Cincinnati (Feb. 2020)

Critical charge fluct. and supercond. in ferromag. Environments - Rutgers (Sept. 2019)

Interaction effects in Aharonov-Bohm-Kondo rings, University of Basel (Jan. 2014)

Majorana fermions and the screening length scale, ETH Zurich (Dec. 2013)

Transport experiments on p-GaAs Q-dots and QPCs, Univ. of Tehran, (Dec. 2013)

Full counting statistics of in a hole quantum dot, Univ. of Konstanz, (Nov. 2011)

Evidence for localization connected to 0.7 anomaly in hole QPCs - Gordon Godfrey Conference, Sydney (Nov. 2009)

Publications: [Selected 10 publications are marked in blue]

Journal papers submitted (theory & collaboration with experimentalists):

[30] E. Koenig, P. Coleman, [Y. Komijani](#), *Frustrated Kondo impurity triad: A toy model of deconfinement*, ArXiv: 2002.12338, submitted to Phys. Rev. Lett.

[29] H. Kobayashi, Y. Sakaguchi, M. Oura, S. Ikeda, K. Kuga, S. Nakatsuji, R. Masuda, Y. Kobayashi, M. Seto, Y. Yoda, [Y. Komijani](#), P. Chandra, P. Coleman, *Observation of a critical charge mode in a strange metal*, submitted to Science (2019).

[28] [Y. Komijani](#), A. Toth, P. Coleman P. Chandra, *Order Parameter Fractionalization*, ArXiv: 1811.11115, submitted to Nature (in review).

Journal papers published (theory):

[27] A. Wulfgater, [Y. Komijani](#), P. Coleman, *Large-N approach to the two-channel Kondo lattice*, Phys. Rev. B **101**, 075133 (2020) [**Editor's suggestion**].

[26] [Y. Komijani](#), *Kondo-based qubits for topological quantum computation*, Phys. Rev. B **101**, 235131 (2020).

[25] [Y. Komijani](#),* P. Coleman,* E. Koenig,* *The Triplet Resonating Valence Bond State & Superconductivity in Hund's Metals*, Phys. Rev. Lett. **125**, 077001 (2020) [* Equal contributions]

[24] B. Shen,* Y. Zhang,* [Y. Komijani](#), M. Nicklas, R. Borth, A. Wang, Y. Chen, Z. Nie, Z. Wang, G. Cao, H. Lee, M. Smidman, F. Steglich, P. Coleman, H. Yuan, *Strange metal behavior in a pure ferromagnetic Kondo lattice*, **Nature** (London) **579**, 51 (2020) .

[23] [Y. Komijani](#),* K. Chen,* *Even-Odd effect in an Spin-S impurity embedded in a quantum critical system*, ArXiv: 1810.12812, Phys. Rev. B **100**, 094514 (2019) [* equal contribution].

[22] [Y. Komijani](#), P. Coleman, *Emergent Critical charge fluctuations at the Kondo breakdown of Heavy-fermions*, Phys. Rev. Lett. **122**, 217001 (2019).

[21] [Y. Komijani](#), K. Hallberg, G. Kotliar, *Renormalized dispersing multiplets in the spectrum of nearly Mott localized systems*, Phys. Rev. B. **99**, 125150 (2019).

[20] [Y. Komijani](#), P. Coleman, *Model for Ferromagnetic Quantum Critical Point in a 1D Kondo Lattice*, Phys. Rev. Lett. **120**, 157206 (2018).

[19] [Y. Komijani](#), G. Kotliar, *Analytical slave-spin mean-field approach to orbital selective Mott insulators*, Phys. Rev. B **96**, 125111 (2017).

[18] Z. Shi, [Y. Komijani](#), *Conductance of closed and open long Aharonov-Bohm-Kondo rings*, Phys. Rev. B, **95**, 075147 (2017).

[17] [Y. Komijani](#), P. Coleman, *Majorana approach to the stochastic theory of lineshapes*, Phys. Rev. B **94**, 085113 (2016).

[16] D. Pikulin, [Y. Komijani](#), I. Affleck, *Luttinger liquid in contact with a Kramers pair of Majorana bound states*, Phys. Rev. B **93**, 205430 (2015).

[15] [Y. Komijani](#), P. Simon, I. Affleck, *Orbital Kondo effect in fractional quantum Hall systems*, Phys. Rev. B **92**, 075301 (2015).

[14] [Y. Komijani](#), I. Affleck, *Effect of disorder on the conductance of (non-) topological SN junctions*, Journal of Statistical Mechanics, P11017 (2014).

[13] [Y. Komijani](#), I. Affleck, *Detecting a quantum critical point in topological SN junctions*, Phys. Rev. B **90**, 115107 (2014).

[12] [Y. Komijani](#), R. Yoshii, I. Affleck, *Interaction effects in Aharonov-Bohm-Kondo rings*, Phys. Rev. B **88**, 245104 (2013) [**Editor's suggestion**].

Journal papers published (experiment):

[11] [Y. Komijani](#), T. Choi, F. Nichele, T. Ihn, K. Ensslin, D. Reuter, A. D. Wieck, *Counting statistics of hole transfer in a p-type GaAs quantum dot with dense excitation spectrum*, Phys. Rev. B **88**, 035417 (2013) [**Editor's suggestion**].

[10] [Y. Komijani](#), M. Csontos, T. Ihn, K. Ensslin, Y. Meir, D. Reuter, A. D. Wieck, *Origins of conductance anomalies in a p-type GaAs point contact*, Phys. Rev. B **87**, 245406 (2013).

[9] F. Nichele, [Y. Komijani](#), S. Hennel, W. Wegscheider, T. Ihn, K. Ensslin, C. Gerl, D. Reuter, A. D. Wieck, *Aharonov-Bohm rings with strong spin-orbit interaction: the role of sample-specific properties*, New J. of Phys. **15**, 033029 (2013).

[8] [Y. Komijani](#), M. Csontos, I. Shorubalko, U. Zulicke, T. Ihn, K. Ensslin, Y. Meir, D. Reuter, A. D. Wieck, *Anisotropic Zeeman splitting in p-type GaAs quantum point contacts*, Europhys. Lett **102**, 37002 (2013).

[7] [Y. Komijani](#), M. Csontos, I. Shorubalko, T. Ihn, K. Ensslin, Y. Meir, D. Reuter, A. D. Wieck, *Evidence for localization and 0.7 anomaly in hole quantum point contacts*, Europhys. Lett. **91**, 67010 (2010).

[6] M. Csontos, [Y. Komijani](#), I. Shorubalko, K. Ensslin, D. Reuter, A. D. Wieck, *Nanostructures in p-GaAs with improved tunability*, Appl. Phys. Lett. **97**, 022110 (2010).

[5] A. Ebrahimi, Y. Abdi, S. Mohajerzadeh, [Y. Komijani](#), *Highly sensitive capacitive transducer based on comb-like array of branched carbon nanotubes*, Proc. Euroensors XXIII Conf. **1**, 1159 (2009).

[4] [Y. Komijani](#), M. Csontos, T. Ihn, K. Ensslin, D. Reuter, A. D. Wieck, *Observation of excited states in a p-GaAs quantum dot*, Europhys. Lett. **84**, 57004 (2008).

[3] B. Khadem-Hosseini, Y. Komijani, R. Faraji, M. Shahabadi, *Using Photon Wave Function for the Time Domain Analysis of Electromagnetic Wave Scattering Problems*, PIER **76**, 397-412 (2007).

[2] Y. Komijani, N. Izadi, B. Khadem-Hosseini, S. Mohajerzadeh, *Ultra-Violet Assisted 3D Microstructures on PET*, IEEE Sensors Journal **6**, 851-853 (2006).

[1] J. Koohsorkhi, Y. Abdi, S. Mohajerzadeh, H. Hosseinzadegan, Y. Komijani, E. Asl Soleimani, *Fabrication of self-defined gated field emission devices on silicon substrates using PECVD-grown carbon nano-tubes*, Journal of Carbon **44**, 2797-2803 (2006).

Unpublished:

Y. Komijani, A. Hooshmand, *A New Modified Split-Connection Approach for Improving TCP Performance Over Wireless Networks*, preprint (2004).