Curriculum Vitae

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Education

- 1/85: Ph.D. in Physics, Cornell University, Ithaca, NY 14853, USA.
- 5/82: M.S. in Physics, Cornell University, Ithaca, NY 14853, USA.
- 8/78: B.S. in Mathematics (first class honors) University of Colombo, Sri Lanka.

Work Experience

- 9/91-present: Professor of Physics, Univ. of Connecticut, Storrs, CT 06269, USA.
- 10/87-8/91: Associate and Assistant Scientist in the Physics Department at Brookhaven National Laboratory, Upton, NY 11973, USA.
- 10/86-9/87: Research Associate in the Condensed Matter Theory Group at Brookhaven National Laboratory, Upton, NY 11973, USA.
- 10/84-9/86: Post Doctoral Research Associate with Prof. B. R. Cooper, Dept. of Physics, West Virginia University, Morgantown, WV 26506, USA.
- 6/81-9/84: Graduate Research Assistant with Prof. John W. Wilkins at LASSP, Physics Dept., Cornell University, Ithaca, NY 14853, USA.

Summary of Research Activities

- Worked on a wide variety of problems in theoretical condensed matter, developing accurate theoretical and computational techniques and applying them to examine bulk and surface electronic structure, chemisorption, stability of crystal structures, elastic properties, cohesion, alloy phase diagrams, point defects in alloys, spectroscopic and magnetic properties of transition metal systems, self diffusion in simple liquid metals, and spintronics in heterojunctions.

- Currently working on floquet systems, organic materials and related superconductivity. Recent work on exact many body calculations of Hubbard nanoclusters has uncovered numerous exotic properties of strongly correlated clusters that have not been seen before. Combining exact diagonalization with statistical mechanics has paved the way to a better understanding of phase diagrams, pseudogaps, magnetism and condensation (among other things) of some of the inhomogeneous materials such as the high temperature superconductors and materials exhibiting colossal magnetoresistance.

- Have authored several computer codes for first principles electronic structure and molecular dynamics, Monte Carlo, as well as Embedded Atom Method based studies.

Professional Honors and Other Activities

- Editorial Board, Advances in Condensed Matter Physics

- Published a book on "Metallic Multilayers and their Applications" (publisher: Elsevier 2008)

- Visiting Professor, Nordita, Stockholm, Sweden (July 2019)

- Visiting Professor, Beijing Computational Science and Research Center (Sep.-Oct. 2018)

- Guest Scientist, Brookhaven National Laboratory, USA (1992 - 2015)

- Visiting Professor, Institute of Fundamental Studies, Kandy, Sri Lanka (1997 - 2007)

- Sri Lankan Presidential Award for research carried out in Sri Lanka (Nov. 2001)

- University of Connecticut Summer Research Fellowship (1993)

- Andrew Mellon Fellowship (1980)

- My student, Min Yu, won a Schlumberger Fellowship (2006)

- A co-author of nearly 100 publications in refereed journals. Also a co-author of about a hundred abstracts and presentations at the March Meeting of the American Physical Society (APS), Materials Research Society meeting, Conference on Physical Electronics, American Vacuum Society meeting. Currently refereeing for several journals of the APS.; have also given invited talks at several work shops on recent developments in electronic structure and supervised several Ph.D. thesis projects.

Publications

1. A Brief Review of Electronic and Magnetic Structure of TIF3, 2440072 https://doi.org/10.1142/S012915642440072X July 2024, International Journal of High Speed Electronics and Systems, Gayanath W. Fernando, Donal Sheets, Jason Hancock, Arthur Ernst, R. Matthias Geilhfue International Journal of High Speed Electronics and Systems 2024 33:02n03
2. Mott insulating negative thermal expansion perovskite TiF3, Donal Sheets, Kaitlin Lyszak, Menka Jain, **Gayanath W. Fernando**, Ilya Sochnikov, Jacob Franklin, R. Mattias Geilhufe, Jason N. Hancock, arXiv:2311.08382 and Physical Review B 108, 235140 (2023).
3. Correlation Driven Magnetic Frustration and Insulating Behavior of TiF_3, **Gayanath W. Fernando**, Donal Sheets, Jason Hancock, Arthur Ernst, and R. Matthias Geilhufe, arXiv:2310.1264v1 (2023) and Physica Status Solidi (Rapid Research Letters), 2300330 (2023).
4. The Quantumness in Detecting Electromagnetic Waves is Determined by the Interaction Properties of the Detector, C. Roychoudhuri, N. Prasad and **G. Fernando**, Fundamental Research and Application of Physical Science Vol. 3, B P International, Print ISBN: 978-81-19217-29-8, eBook ISBN: 978-81-19217-05-2 (2023),
5. Structural and electronic properties of rare-earth chromites: A computational and experimental study, Jianhang Shi, **Gayanath W. Fernando**, Yanliu Dang, Steven L. Suib and Menka Jain (Phys. Rev. B106, 165117, 2022).
6. Understanding physical processes behind the photoelectric current pulse (PCP) statistics and designing better sources, C. Roychoudhuri, **G. Fernando**, and N. Prasad, Proc. SPIE 12243, Photonics for Quantum 2022, 1224303 (19 July 2022).
7. Driven emergent phases in small interacting condensed-matter systems, **Gayanath W. Fernando**, R. Matthias Geilhufe, Adil-Gerai Kussow and W. Wasanthi P. De Silva, European Physics Letters, Volume 134, 37004 (2021).
8. Multi-hole bands and quasitwo-dimensionality in Cr2Ge2Te6 studied by angle-resolved photoemission spectroscopy, Turgut Yilmaz, Matthias Geilhufe, I. Pletikosic, **G. W. Fernando** et al. European Physics Letters, Volume 133, 27002 (2021).
9. Contrasting quantum sensing light source properties, which generate different photocurrent pulse-statistics, Chandra Roychoudhury, **G. W. Fer-**

nando et al. Proc. of SPIE, Quantum sensing, nano-electronics and photonics XVII, 11288-15 (2020), DOI: 10.1117/12.2551090

10. Chemical-Strain Induced Tilted Dirac Nodes in$(BEDT\text{-}TTF)_2X_3$(X = I, Cl, Br, F) Based Charge-Transfer Salts, R. M. Geilhufe, B. Commeau, and **G. W. Fernando**, Physica Status Solidi (Rapid Research Letters), 1800081 (2018). (DOI: 10.1002/pssr.201800081).

11. Structural and electronic properties of α-$(BEDT\text{-}TTF)_2I_3$, β-$(BEDT\text{-}TTF)_2I_3$ and κ-$(BEDT\text{-}TTF)_2X_3$ (X=I,F,Br,Cl) organic charge transfer salts, B. Commeau, R. M. Geilhufe, **G. W. Fernando**, A. V. Balatsky, Physical Review B **96**, 125135 (2017).

12. From a $\mathcal{Z}_2$ topological insulator to a square ribbon: Tuning quantum spin Hall states and conductivity, Zhiwei Zhang, Yiteng Tang, and **Gayanath Fernando**, Journal of Applied Physics, **121**, Issue 20, 204302 (2017).

13. Spin-orbit coupling, electron transport and pairing instabilities in two-dimensional square structures, Armen. N. Kocharian, **Gayanath W. Fernando**, Kun Fang, Kalum Palandage and Alexander V. Balatsky, AIP Advances, **6**, 055711 (2016).

14. Possible phase separation in square and honeycomb Hubbard model: A variational cluster study, Kun Fang, **G. W. Fernando**, A. V. Balatsky and A. N. Kocharian, Physics Letters A 379, 2230 (2015).

15. Phase separation instabilities and magnetism in two-dimensional square and honeycomb Hubbard model, A. N. Kocharian, Kun Fang, **G. W. Fernando** and A. V. Balatsky, Journal of Magnetism and Magnetic Materials, **383**, 8 (2015).

16. Phase separation instabilities and pairing modulations in $Bi_2Sr_2CaCu_2O_{8+\delta}$, Kun Fang, **G. W. Fernando**, A. Balatsky, A. N. Kocharian and K. Palandage, Physics letters A 378, 243 (2014).

17. A Physics Based Lagrangian for the Heat-Diffusion Equation, B. Cassenti, A. Staroselsky and **G. W. Fernando**, Philosophical Magazine Letters, Vol. 93, Issue 5, 307-315 (2013).

18. Nematicity in the two-dimensional one-band Hubbard model, Kun Fang, **G. W. Fernando** and A. N. Kocharian, J. Phys: Condens. Matter, Vol. 25, 205601 (2013).

19. Quantum Critical Points and Phase Separation Instabilities in Hubbard Nanoclusters, A. N. Kocharian, **G. W. Fernando** and K. Fang, Journal of Magnetism and Magnetic Materials, **324**, 3427 (2012).

20. Tracing Magnetism and pairing in FeTe-based systems, K. Palandage,

G. W. Fernando, Kun Fang and A. N. Kocharian, Journal of Materials Science, Vol.47, 7671 (2012).

21. Pairing Enhancement in Betts Lattices with Next Nearest Neighbor Couplings; Exact Results, K. Fang, **G. W. Fernando** and A. N. Kocharian, Physics Letters A **376**, 538 (2012)- available online Dec. 2011.

22. A.N. Kocharian, **G.W. Fernando**, and C. Yang, Spin and Charge Pairing Instabilities in Nanoclusters and Nanomaterials, Chapter 15 pp. 507-570 in Scanning Probe Microscopy in Nanoscience and Nanotechnology, ed. by Bharat Bhushan (Springer 2010).

23. Role of point defects on conductivity, magnetism and optical properties in In_2O_3, Kalum Palandage and **G. W. Fernando**, Physics Letters A **374**, 2879 (2010).

24. Electron coherent and incoherent pairing instabilities in inhomogeneous bipartite and nonbipartite nanoclusters, A. N. Kocharian, **G. W. Fernando**, K. Palandage, and J. W. Davenport, Phys. Lett. A**373**, 1074-1082 (2009).

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26. An energy conservation approach to adsorbate-induced surface stress and the extraction of binding energy using nanomechanics, L. A. Pinnaduwage, V. I. Boiadjiev, J. E. Hawk, A. C. Gehl, **G. W. Fernando** and L. C. R. Wijewardhana, Nanotechnology, **19**, 105501 (2008)

27. Coherent and incoherent pairing instabilities and spin charge separation in bipartite and nonbipartite nanoclusters: Exact results, A. N. Kocharian, **G. W. Fernando**, K. Palandage and J. W. Davenport Physical Review B **78**, 075431 (2008)

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29. Phase separation and electron pairing in repulsive Hubbard Clusters, **G. W. Fernando**, A. N. Kocharian, K. Palandage, Tun Wang and J. W. Davenport, Physical Review B **75**, 085109 (2007)

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63. Spin and Orbital Contributions to Surface Magnetism in 3*d* Elements by O. Eriksson, A. M. Boring, R. C. Albers, G. W. Fernando and B. R. Cooper, *Physical Review B* **45** *2868 (1992)*

64. Cohesion and Promotion Energies in Transition Metals: Implications of the local density Approximation by R. E. Watson, G. W. Fernando, M. Weinert, Y. J. Wang and J. W. Davenport, *Journal of Applied Physics* **69**, *5688 (1991)*

65. The Local Density Approximation: Cohesion in the Transition Metals and $s \longrightarrow d$ Promotion in the Transition Metal Atoms by R. E. Watson, G. W. Fernando, M. Weinert, Y. J. Wang and J. W. Davenport, *Physical Review B43, 1455 (1991)*

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R. E. Watson, M. Weinert and G. W. Fernando, *Physical Review B***43**, *1446 (1991)*

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