CHINEDU E EKUMA

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Career Objective

My research focuses on computer-aideddesign and simulations to understand the fundamental origin of thecomplex behaviors in materials. On one hand, I use techniques free from empirical approximations, known as*ab-initio*methods and on the other hand, methodsparameterizedfrom *first-principles* to make predictions aboutmaterials, structures, and properties to guide in the experimental search for new or improved materials. I have a strong background in algorithm and code development for studying correlated systems, and a track record of solving complex and fundamental scientific & engineering problems. Through research, I hope to contribute to future scientific discoveries for the betterment of humanity and through teaching and mentoring, I hope to pass the baton of excellence in science and technology innovation to future generations.

Research Experience and Interest	◦ High-throughput Computer-aided Materials Design and Discovery. ◦ Defects in Materials & Model Systems using Multiscale Approaches. ◦ Fundamentals of Materials Science and Quantum Chemistry. ◦ Emerging Physics in Low-dimensional Materials/Systems & Related Quantum Critical Phenomena. ◦ First-principles, Many-body study of Electronic & Related Properties of Materials. ◦ Algorithm Development for solving Complex Problems. ◦ STEM Education, Public Outreach Activities, and Technological Innovations.

EXPERIENCE (RESEARCH AND TEACHING)

Assistant Professor **2019-present**

Department of Physics, Lehigh University, Bethlehem, PA.

- Student mentoring, teaching graduate and undergraduate students
- Algorithm and code development for studying correlated systems
- First-principles study of diverse materials including nanostructures and interfaces

Research Fellow **2018-present**

George F. Adams Distinguished Research Fellow, U.S. Army Research Lab., Adelphi, MD.

- Development and application of many-body approaches to design and discover technologically relevant low-dimensional materials.
- First-principles study of surfaces and interfaces.

Research Fellow **2015-2017**

National Research Council, the National Academies, U.S. Naval Research Lab., Washington, DC.

- **Initiated and developed a first-principles Typical Medium Dynamical Cluster Approximation plus density functional theory (TMDCA@DFT)**, which is a mean-field approach with an *intrinsic order parameter* for the *proper* characterization of electron localization in materials.
- Demonstrated expertise in first-principles, many-body study of low-dimensional materials.
- Initiated ideas for algorithm and code development to study correlated materials.

Research Associate **May-Jul 2015**

Department of Physics & Astronomy, Louisiana State University, Baton Rouge, LA, USA

- Algorithm development.
- Initiated and performed code development for studying many-body systems.
- Contributed to grant writing

Research/Teaching Assistant **2010-2015**

Department of Physics & Astronomy, Louisiana State University (LSU), Baton Rouge, LA, USA

- Algorithm and code development.
- **Pioneered the development of the TMDCA for the proper study of electron localization in model systems**.
- Use of various many-body approaches, e.g., quantum Monte-Carlo to study correlated systems.
- Studied many materials, e.g. Pd/Pb-Chalcogenides, CdO, Fe_3G_4, CuO, Metal Nitrides, and $Ba_2Mn_2Sb_2O$ using density functional theory (DFT) and many-body approaches.
- Provided computational support to experimental groups at LSU.
- Student Mentoring: Elizabeth Hilliard (A student in the Summer Undergraduate Research Experiences. Currently a graduate student at LSU), Elisha Siddiqui (Graduate student at LSU), Wasim Raja Mondal and Sudeshna Sen (visiting students from India), Ifeanyi Nwigboji (Southern University, Baton Rouge,

LA currently a Ph.D. student at University of Texas at El Paso), John Ejembi (Southern University, Baton Rouge, LA currently a Ph.D. student at Southern Illinois University, Carbondale), etc.
- Tutoring at the Center for Academic Success.
- Volunteered at the departmental and university-wide science events, e.g., NanoDay, super science Saturday, etc. 2011-2015.
- Certificate of course completion on "Best Practices in Scientific Teaching in STEM"– 2012.

Research/Teaching Assistant **2009-2010**

Department of Physics, Southern University (SUBR), Baton Rouge, LA, USA
- **Initiated and contributed to the development of a LCAO-based, first-principles approach: Bagayoko-Zhao-Williams-Ekuma-Franklin method that improves the band gap of materials**.
- Student mentoring at the Timbuktu Academy, the Presidential Merit Award winner in STEM mentoring.

Lecturer **2007-2009**

Department of Physics, University of Port Harcourt, Nigeria
- Supervised over ten undergraduates on senior thesis and mentored over one-hundred undergraduates.
- Teaching of undergraduate courses, e.g., quantum mechanics, mathematical physics, and modern physics.
- Departmental coordinator of Student industrial work experiences (SIWES).
- Departmental coordinator of students' community services and physics lab.
- Performed research, other assigned duties, and community service.

EDUCATION

Ph.D. Computational Condensed Matter and Materials Physics **May 2015**

Louisiana State University, Baton Rouge, LA, USA
- ***Dissertation:*** "Towards the Realization of Systematic, Self-Consistent Typical Medium Theory for Interacting Disordered System."
- ***Committee:*** Profs. Mark Jarrell, Juana Moreno, David Singh, John Perdew, Diola Bagayoko, John DiTusa, and Konstantin Busch.

M.Sc. Computational Physics **July 2010**

Southern University and A&M College, Baton Rouge, LA, USA
- ***Thesis:*** "Correct Density Functional Theory Description of Electronic Properties of CdS and Ferro-$NaNO_2$."
- ***Advisors:*** Profs. Diola Bagayoko and Jin Tong Wang.

M.Sc. Theoretical Physics **June 2009**

University of Nigeria, Nigeria
- ***Thesis:*** "Thermodynamics of Continuous Phase Transition."
- ***Advisors:*** Profs. C. M. I. Okoye and G. C. Asomba.

B.Sc. (*S*umma Cum Laude) Industrial Physics **Jan. 2007**

Ebonyi State University, Nigeria
- ***Thesis:*** "Effects of Zinc Addition on the Corrosion Susceptibility of Aluminum Alloy in Selected Media Concentration."
- ***Advisor:*** Prof. N. E. Idenyi.

GRANT AWARDS:

- co-PI: "Transistors in 2D materials: Disorder-induced localization". Department of the Navy, Naval Research Lab., July-Dec. 2016, $90,000.
- PI: "First-principles typical medium study of electron localization in low-dimensional systems", Over 200,000 compute-times awarded, XSEDE, through NSF grant TG-DMR160027, 2016-2017.
- PI: "1st Workshop on the Fundamental Physics of Energy Materials", University of Port Harcourt, Nigeria, 2014. NSF through the Institute for Complex Adaptive Matter. Recommended but wasn't granted due to safety concerns in Nigeria.

AWARDS AND HONORS

Awards:
- George F. Adams Distinguished Research Fellow: 2018.
- NRC-NAS[1] Research Fellowship: 2015.
- NRC-NAS Research Fellowship: 2015: Recommended, funding unavailable at the time.
- **3rd place**, Sigma Xi Student Research Showcase: 18-23rd March, 2013.
- NSF[2] Travel Awards to attend APS[3] Energy Workshops: 2012 and 2013.
- NSF Travel Award to attend strong correlation from first-principles, Germany, 2011.
- **Best Poster Awards 2011, 2012, and 2013**: LA-SiGMA[4]-EPSCoR[5] all-hands meetings.
- **2nd place in Energy Section**: EPSCoR 22nd conference, Idaho, 2011.
- **Graduate Enhancement Award**, Louisiana State University, USA, 2010.
- **Graduate fellowship**, University of Southern California and Department of Energy, 2009.
- **Best graduating student** 2005/2006 Academic session, Ebonyi State, Nigeria.
- **$3,000 Award:** Association for Iron and Steel Technology, 2008.
- National Merit Scholarship Awards for Undergraduates, Nigeria, 2002.

Honors:
- Award of Academic Excellence, Alike-Ikwo, Ebonyi, Nigeria, 2009.
- Award of Academic Excellence, Ebonyi State University, Nigeria, 2007.

SKILLS/SOFTWARE/PERSONALS

Scientific Software:	WIEN2k, VASP, ABINIT, QuantumExpresso, Gaussian, Crystal, Gulp, LaTeX, etc.
Operating Systems:	Linux, MAC, Windows.
Languages:	Fortran, C++, Python, Matlab, Bash shell scripting.
	Strong oral communication and writing skills.
Personals:	Scientific Freelancing and Editing; Reading; Soccer; and Listening to music.

PROFESSIONAL MEMBERSHIP AND SERVICES:

Member: American Physical Society; Phi Kappa Phi; Omicron Delta Kappa; Sigma Xi; National Association of Black Physicists; Nigerian Institute of Physics; Material Society of Nigeria; International Union of Crystallographers; Institute of Physics; European Crystallographers Association; Minerals, Metals, and Materials Society; American Ceramic Society; American Vacuum Society.

Referee: Physical Review and Physical Review Letters; Phase Transitions (Taylor & Francis); AIP Journals: Applied Physics, AIP Advances, Journal of Physics D; Royal Society of Chemistry Journals: Nanoscale, Journal of Materials Chemistry C; Elsevier Journals: Physica B, Materials Chemistry and Physics, Computational Materials Science, Journal of Alloys and Compounds, Journal of Physics and Chemistry of Solids, etc.; Springer Journals: Materials Engineering and Performance, Pramana-Journal of Physics, Material Science, Acta Metallurgica Sinica (English Letters), Journal of Electronic Materials; Materials Research Express; Journal of Physical Chemistry.

OUTREACH ENGAGEMENTS AND COMMUNITY SERVICES:

- Mentoring of students. **A 2013 summer REU mentee won the best poster award** at the LA-SiGMA All-hands Meeting, 29th July, 2013.
- Volunteering at STEM-related events, e.g., various LA-SiGMA events, NanoDay, super science Saturday etc. from 2011-2015.
- Led in organizing the annual LA-SiGMA students' retreat from 2011-2015.
- Volunteer teacher in Physics and Mathematics at local high schools back in Nigeria.

SELECTED PUBLICATIONS AND PREPRINTS:

○ Refereed Journal Publications:

Citations: ∼ 640, source: Google Scholar

1. *"Optical absorption in monolayer SnO_2"* **C. E. Ekuma**. Phys. Rev. B (2019) *In press.*
2. *"Fingerprints of native defects in monolayer PbTe"* **C. E. Ekuma**. Nanoscale Adv. (2019). DOI: 10.1039/C8NA00125A.

[1]NRC-NAS: National Research Council-National Academies of Science
[2]NSF: National Science Foundation
[3]APS: American Physical Society
[4]LA-SiGMA: Louisiana Alliance for Simulation-Guided Materials Applications
[5]EPSCoR: Established Program to Stimulate Competitive Research

3. *"Observation of novel multifunctionalities in monolayer CdO"* **C. E. Ekuma**. Advanced Theory and Simulations. **1**(12), 1800107 (2018). DOI: 10.1002/adts.201800107.
4. *"Effects of vacancy defects on the electronic and optical properties of monolayer PbSe"* **C. E. Ekuma**. J. Phys. Chem. Lett. **9**(13), 3680 (2018). DOI: 10.1021/acs.jpclett.8b01585.
5. *"Two-particle excitations under coexisting electron interaction and disorder"* **C. E. Ekuma**. Phys. Rev. B **98**, 085129 (2018). DOI: 10.1103/PhysRevB.98.085129.
6. *"Optical absorption in monolayer molybdenum disulfide"* **C. E. Ekuma** and D. Gunlycke. Phys. Rev. B **97**, 201414(R) (2018). DOI: 10.1103/PhysRevB.97.201414.
7. *"First-principles calculations of sarin adsorption on anatase surface"* N. Q. Lee, **C. E. Ekuma** *et al.* J. Phys. Chem. C. **122**(3), 2832 (2018). DOI: 10.1021/acs.jpcc.7b11509.
8. *"First-principles-based method for electron localization: Application to monolayer hexagonal boron nitride"* **C. E. Ekuma**, V. Dobrosavljević, and D. Gunlycke. Phys. Rev. Lett. **118**, 106404 (2017). DOI: 10.1103/PhysRevLett.118.106404. **Featured in the Naval Research Laboratory news and featured in various leading science news outlets**.
9. *"Electronic structure and X-ray spectroscopy of $Cu_2MnAl_{1-x}Ga_x$"* **C. E. Ekuma** *et al.* J. Appl. Phys. **123**, 161509 (2018). DOI: 10.1063/1.4996650.
10. *"Electronic, optical, and thermoelectric properties of $Fe_{2+x}V_{1-x}Al$"* D. P. Rai, Sandeep, A. Shankar, R. Khenata, A. H. Reshak, **C. E. Ekuma**, *et al.* AIP Advances **7** 045118 (2017). DOI: 10.1063/1.4982671.
11. *"Metal-Insulator-Transition in a Weakly interacting Disordered Electron System"* **C. E. Ekuma**, S.-X. Yang, H. Terletska, K.-M. Tam, N. S. Vidhyadhiraja, J. Moreno, and M. Jarrell. Phys. Rev. B Rapid Commun. **92**, 201114(R) (2015). DOI: 10.1103/PhysRevB.92.201114.
12. *"Study of multiband disordered systems using the typical medium dynamical cluster approximation"* Y. Zhang, H. Terletska, C. Moore, **C. E. Ekuma**, K.-M. Tam, T. Berlijn, W. Ku, J. Moreno, M. Jarrell. Phys. Rev. B **92**, 205111 (2015). DOI: 10.1103/PhysRevB.92.205111.
13. *"Finite Cluster Typical Medium Theory for Disordered Electronic Systems"* **C. E. Ekuma**, H. Terletska, C. Moore, K.-M. Tam, N. S. Vidhyadhiraja, J. Moreno, and M. Jarrell. Phys. Rev. B **92**, 014209 (2015). DOI: 10.1103/PhysRevB.92.014209.
14. *"Competing magnetic states, disorder, and the magnetic character of Fe_3Ga_4 "* J. H. Mendez, **C. E. Ekuma**, Y. Wu, B. W. Fulfer, J. C. Prestigiacomo, W. A. Shelton, M. Jarrell, J. Moreno, D. P. Young, P. W. Adams, A. Karki, R. Jin, Julia Y. Chan, J. F. DiTusa. Phys. Rev. B. **91**, 144409 (2015). DOI: 10.1103/PhysRevB.91.144409.
15. *"Ab-Initio computations of electronic and transport properties of wurtzite aluminum nitride (w-AlN) "* I. H. Nwigboji, J. I. Ejembi, Y. Malozovsky, B. Khamala, L. Franklin, G.-L. Zhao, **C. E. Ekuma**, D. Bagayoko. Mat. Chem. Phys. **157** 80 (2015). DOI: 10.1016/j.matchemphys.2015.03.019.
16. *"Ab initio prediction of electronic, transport and bulk properties of Li_2S "* Y. Malozovsky, L. Franklin, **C. Ekuma**, D. Bagayoko. Int. J. Mod. Phys. B. **29** 1542006 (2015). DOI: 10.1142/S0217979215420060.
17. *"Study of off-diagonal disorder using the typical medium dynamical cluster approximation "* H. Terletska, **C. E. Ekuma**, C. Moore, K.-M. Tam, J. Moreno, and M. Jarrell. Phys. Rev. B **90**, 094208 (2014). DOI: 10.1103/PhysRevB.90.094208.
18. *"A Typical Medium Dynamical Cluster Approximation for the Study of Anderson Localization in Three Dimensions"* **C. E. Ekuma**, H. Terletska, K.-M. Tam, Z.-Y. Meng, J. Moreno, and M. Jarrell. Phys. Rev. B Rapid Commun. **89**, 081107(R) (2014). DOI: 10.1103/PhysRevB.89.081107.
19. *"Effective Cluster Typical Medium Theory for Diagonal Anderson Disorder Model in One- and Two-Dimensions"* **C. E. Ekuma**, H. Terletska, Z.-Y. Meng, J. Moreno, M. Jarrell, S. Mahmoudian, and V. Dobrosavljević. J. Phys.: Condens. Matter **26** 274209 (2014). DOI: 10.1088/0953-8984/26/27/274209.
20. *"Electronic Structure and Spectra of CuO"* **C. E. Ekuma**, V. I. Anisimov, J. Moreno, M. Jarrell The European Physical Journal B **87** 23 (2014). DOI: 10.1140/epjb/e2013-40949-5.
21. *"Electronic, transport, optical, and structural properties of rocksalt CdO"*, **C. E. Ekuma**, J. Moreno, and M. Jarrell. J. Appl. Phys. **114**(15) 3705 (2013). DOI: 10.1063/1.4825312.
22. *"First-principles Wannier function analysis of the electronic structure of PdTe: weaker magnetism and superconductivity"* **C. E. Ekuma**, Chia-Hui Lin, J. Moreno, W. Ku, and M. Jarrell. J. Phys.: Condens. Matter **25** 405601 (2013). DOI: 10.1088/0953-8984/25/40/405601.
23. *"Re-examining the Electronic Structure of Ge: A first Principle Study"* **C. E. Ekuma**, D. Bagayoko., J. Moreno, and M. Jarrell. Physics Letters A, **377**(34-36), 2172–2176 (2013). DOI: 10.1016/j.physleta.2013.05.043
24. *"Ab-Initio Calculation of Electronic Properties of InP and GaP"* Y. Malozovsky, L. Franklin, **C. E. Ekuma**, G. L. Zhao, and D. Bagayoko. Inter. J. Mod. Phys. B **27**(5), 1362013-1 (2013). DOI: 10.1142/S0217979213620130
25. *"Density functional theory description of electronic properties of wurtzite zinc oxide"* L. Franklin, **C. E. Ekuma**, G. L. Zhao, and D. Bagayoko. Journal of Physics and Chemistry of Solids **74**(5), 729 – 736 (2013). DOI: 10.1016/j.jpcs.2013.01.013

26. *"Physical Properties of $Ba_2Mn_2Sb_2O$ Single Crystals"* J. Li, **C. E. Ekuma**, I. Vekhter, *et al.* Phys. Rev. B **86**, 195142 (2012). DOI: 10.1103/PhysRevB.86.195142
27. *"First Principle Local Density Approximation Description of the Electronic Properties of Ferroelectric Sodium Nitrite"* **C. E. Ekuma**, M. Jarrell, J. Moreno, L. Franklin, G. L. Zhao, J. T. Wang, and D. Bagayoko. Materials Chemistry and Physics, **136**, 1137 – 1142 (2012). DOI: 10.1016/j.matchemphys.2012.08.066
28. *"Electronic, Structural, and Elastic Properties of Metal Nitrides XN (X = Sc, YN): A first Principle Study"* **C. E. Ekuma**, J. Moreno, M. Jarrell, and D. Bagayoko. AIP Advances, **2**, 032163 (2012). DOI: 10.1063/1.4751260
29. *"First Principle Electronic, Structural, Elastic, and Optical Properties of Strontium Titanate"* **C. E. Ekuma**, M. Jarrell, J. Moreno, and D. Bagayoko. AIP Advances, **2**, 012189 (2012). DOI: 10.1063/1.3700433
30. *"Optical Properties of PbTe and PbSe"* **C. E. Ekuma**, David J. Singh, J. Moreno, and M. Jarrell. Phys. Rev. B **85**, 085205 (2012). DOI: 10.1103/PhysRevB.85.085205
31. *"Ab-initio Electronic and Structural Properties of Rutile Titanium Dioxide"* **C. E. Ekuma** and D. Bagayoko. Jpn. J. Appl. Phys. **50**, 101103 (2011). DOI: 10.1143/JJAP.50.101103. **First computational result predicting indirect gap in rutile TiO_2.**
32. *"Fingerprints of disordered graphene"* **C. E. Ekuma** *et al.* Manuscript in preparation.
33. *"Oxygen vacancy in anatase titanium dioxide"* **C. E. Ekuma** *et al.* Manuscript in preparation.

- **Conference Proceedings:**

1. *"Dynamical Cluster Approximation – Typical Medium Theory Approach to Disordered system"* **C. E. Ekuma**, Z. Y. Meng, H. Terletska, J. Moreno, M. Jarrell, and V. Dobrosavljević. Proceedings, Louisiana EPSCoR RII LA-SiGMA Symposium, 21 -24 (2012).
2. *"Self-consistent Calculations of Electronic Properties of Systems with Energy or Band gaps"* D. Bagayoko, L. Franklin, and **C. E. Ekuma**. Proceedings, Louisiana EPSCoR RII LA-SiGMA Symposium, 117 (2012).
3. *"First Principle Study of Electronic Properties of Rutile Titanium (IV) Oxide"* **C. E. Ekuma**, J. Moreno, M. Jarrell, and D. Bagayoko. Louisiana EPSCoR LA-SiGMA Symposium, 49 -52 (2011).
4. *"GPGPU Computing: Massively Parallel Accelerated Science, Proceedings of Louisiana"* C. W. Moore, D. Z. Poliakoff, J. Caprino, S. Abu Asai, K. R. Rajagopalan, S. -X. Yang, **C. E. Ekuma**, *et al.* Louisiana EPSCoR LA-SiGMA Symposium 57 -60 (2011).
5. *"Local Density Approximation Description of Electronic Properties of Wurtzite Cadmium Sulfide (w-CdS)"*, **C. E. Ekuma**, L. Franklin, G. L. Zhao, *et al*, Louisiana Academy of Science (2010).
6. *"First Principle Study of Electronic Structures of w-CdS, Zb-CdS, w-ZnO and Ferro-$NaNO_2$"* **C. E. Ekuma**, D. Bagayoko, G.L. Zhao, L. Franklin, and J.T. Wang. African Journal of Physics **3**, 119 (2010).

SELECTED CONFERENCES AND INVITED TALKS:

- **Selected Recent Invited Seminars and Colloquia:**

1. "Accelerating Materials Discovery through Computational Design and Simulation", Department of Physics, Lehigh University, Bethlehem, PA, Jan. 26, 2018
2. "Computational Capabilities and Concepts for 21st Century Materials and Applications", Department of Physics, Lehigh University, Bethlehem, PA, Jan. 25, 2018
3. "Computational Capabilities and Concepts for 21st Century Materials and Applications". Department of Physics, Howard University, Washington DC, Oct. 25, 2017.
4. "Accelerating Materials Discovery Through Computational Design and Simulation". Army Research Laboratory-Aberdeen Proving Ground, MD, Oct. 17, 2017.
5. "Accelerating Materials Discovery Through Computational Design and Simulation". Army Research Laboratory-Adelphi Laboratory Center, MD, Oct. 16, 2017.
6. " From lattice model to realistic materials". Chemical & Biomedical Engineering, Florida State University and Florida A&M University, Tallahassee, FL, Oct. 6, 2017.
7. " Atomic defects in materials". Department of Physics, Worcester Polytechnic Institute, Worcester, MA, Sept. 21, 2017.
8. " First-principles simulation of electron localization in materials". Department of Physics, Rochester Institute of Technology, Rochester, New York, Feb. 22, 2017.
9. "Ab-initio study of electron localization in low-dimensional materials". Department of Physics, Rochester Institute of Technology, Rochester, New York, Sept. 30, 2016.https://www.rit.edu/science/event/51277/physics-colloquiumcekuma.
10. "The role of spatial and electron correlations in electron localization in materials". Department of Physics, Howard University, Washington DC., Sept. 21, 2016. http://www.physics1.howard.edu/news/news_

seminar_Chinedu_16.html.

11. "First-principles-based method for electron localization". Center for Materials Physics and Technology, Naval Research Lab., Washington DC., August 13, 2016.
12. "The role of weak interactions on the mobility-edge of strongly disordered electron systems". in the session "New developments in the dtudy of inhomogeneous strongly correlated quantum systems." The 2016 Annual Meetings of APS at Boston, MA, March 14, 2016. https://absuploads.aps.org/presentation.cfm?pid=11516.
13. "Cluster typical medium theory approach to disordered system". Southern University and A&M College, Baton Rouge, LA. May 9, 2012.
14. "First-principles study of electronic structures of w-CdS, zb-CdS, and Ferro-$NaNO_2$". Third International Seminar on Theoretical Physics and National Development, National Mathematical Center, Abuja, Nigeria, July 21, 2010.

- **Conference Presentations:**

1. **C. E. Ekuma**, S. Najmaei , Y. Zhao, P. M. Zaghloul, and M. Dubey "Enhancing multifunctionalities of transition-metal dichalcogenide monolayersvia intercalation", Army Research Lab., Aberdeen Proving Ground, MD.
2. S. Najmaei, **C. E. Ekuma**, and M. Dubey, "Intercalation of van der Waals layers for multifunctional applications in the Symposium: Recent Advances in Functional Materials and 2D/3D Processing for Sensors and Electronic Applications", 2019 TMS Annual Meeting & Exhibition, San Antonio, Texas.
3. **C. E. Ekuma**, V. Dobrosavljević, and D. Gunlycke, "Fingerprints of disordered nanostructure materials". 2018 Annual Meetings of APS, Los Angeles, CA, March 7, 2018.
4. **C. E. Ekuma** and D. Gunlycke, "Exploring the fingerprints of disordered monolayer MoS_2". 64th International Symposium, and Exhibition, American Vacuum Society , Tampa, FL, USA, Nov. 2, 2017.
5. **C. E. Ekuma** and D. Gunlycke, "A first-principles study of the role of defects and electron correlations in monolayer molybdenum disulfide". 2017 Annual Meetings of APS, New Orleans LA, March 16, 2017.
6. **C. E. Ekuma**, V. Dobrosavljević, and D. Gunlycke, "New computational tool for electron localization: Application to low-dimensional monolayers of h-BN and MoS_2". 63rd International Symposium, and Exhibition, American Vacuum Society , Nashville, TN, USA, Nov. 7, 2016.
7. **C. E. Ekuma**, H. Terletska, S. Yang, and *et al*, "Weakly interacting disordered electron systems". 2015 Annual Meetings of APS, San Antonio, TX, March 3, 2015.
8. **C. E. Ekuma**, H. Terletska , K.-M. Tam , and *et al*, "Towards the Realization of Self-Consistent Effective Medium Theory for Anderson Disorder Model". 2014 APS Annual Meetings at Denver, Co, March 4, 2014.
9. **C. E. Ekuma**, Cluster extension of CPA via dynamical cluster approximation-Typical medium theory". The SigmaXi virtual student research showcase: 18-23rd March 2013. **(Won 3rd place in physics)**.
10. **C. E. Ekuma**, Z. Meng, H. Terletska, J. Moreno, M. Jarrell, and V. Dobrosavljević, "Anderson localization: dynamical cluster approximation-Typical medium theory perspective". The 2013 Annual Meetings of APS, Boston, MA, March 18, 2013.
11. D. Bagayoko, L. Franklin, **C. E. Ekuma**, and Y. Malozovsky, "The physical content of eigenvalues from density functional theory (DFT)". The 2013 Annual Meetings of APS at Boston, MA, March. 21, 2013.
12. **C. E. Ekuma**, Z. Y. Meng, H. Terletska, W. Ku, and *et al.* "Dynamical cluster approximation-Typical medium theory approach to disordered system". LA-SiGMA EPSCoR All-hands Meeting, July 23, 2012 (**Adjudged the best poster by the External Review Board**).
13. **C. E. Ekuma**, Z. Y. Meng, H. Terletska, and *et al.* "Cluster typical medium approach to disordered system". 2nd Annual LA-SiGMA graduate Students' retreat. Tulane University, 2nd July 2012.
14. D. Bagayoko, **C. E. Ekuma**, and L. Franklin. "The transformative BZW-EF method and the solution to the "Band Gap Problem". LA-SiGMA EPSCoR All-hands Meeting, April 2, 2012.
15. **C. E. Ekuma**, W. Ku, T. Berlijn, and *et al*, "Dynamical cluster approximation: cluster extension of CPA for disordered system". 2012 APS annual meetings, Boston, MA, Feb. 29, 2012. http://meetings.aps.org/link/BAPS.2012.MAR.T7.11.
16. **C. E. Ekuma**, D. J. Singh, M. Jarrell, and J. Moreno. "Optical properties of PbTe and PbSe". APS annual meetings, Boston, MA. Feb. 29, 2012. http://meetings.aps.org/link/BAPS.2012.MAR.S1.115.
17. **C. E. Ekuma**, M. Jarrell, J. Moreno, and D. Bagayoko. "First principle ab-initio study of TiO_2". APS annual meetings, Boston, MA. Feb. 28, 2012. http://meetings.aps.org/link/BAPS.2012.MAR.K1.122.
18. **C. E. Ekuma**, J. Moreno, M. Jarrell, D. J. Singh, and D. Bagayoko. "First principle ab-initio study of TiO_2 and PbTe". 22nd EPSCoR conference, Coeur d'Alene, Idaho, October 24-27, 2011. (**Poster won the 2nd position in the Energy section**). http://www.idahoepscor.org/DrawPosters.aspx?PosterID=27&PosterCategoryID=1&Action=GetDetails
19. **C. E. Ekuma**, M. Jarrell, J. Moreno, and D. Bagayoko. "Electronic band structure of MnX (X = Si, Ge)". National Society of Black Physicist (NSBP) conference, Austin, Texas, Sept. 21-25, 2011.
20. **C. E. Ekuma**,G.L. Zhao, L. Franklin, and D. Bagayoko. "Density functional theory description of se-

lected materials". Conference on emerging trends in materials simulations and experiments, Rancho Palos Verdes, CA, 2010.

- **Press Release:**
  1. U.S. Naval Research Laboratory: U.S. Naval Research Laboratory scientists simulate electron localization in materials. https://www.nrl.navy.mil/media/news-releases/2017/US-Naval-Research-Laboratory-scientists-simulate-electron-localization-in-real-materials
  2. Phys.org: Scientists simulate electron localization in materials. https://phys.org/news/2017-03-scientists-simulate-electron-localization-real.html
  3. Southern University has solid representation at research gathering. http://www.subr.edu/index.cfm/newsroom/detail/256
- **Books:**
  1. A.E. Umahi and **C. E. Ekuma**, Basic Concepts in Quantum Mechanics, Glanic Ventures, Nigeria (2007).

MEETINGS, CONFERENCES, AND WORKSHOPS

1. American Physical Society (APS) March Meetings: 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018.
2. American Vacuum Society 63rd Annual Conference, Nashville, TN, 2016.
3. Louisiana Alliance for Simulation-Guided Materials Applications All-hands Meetings: 2010-2015.
4. 22nd Conference of Established Program to Stimulate Competitive Research (EPSCoR), Coeur d'Alene, Idaho, USA. October 24-27, 2011.
5. Virtual School of Computation Science and Engineering (VSCSE) Summer School, LSU: 2010-2012.
6. Strong Correlation from First-principles, Monastery Seeon, Bavaria, Germany, Aug. 30-Sept. 2, 2011.
7. Hands-on DFT Workshop, Louisiana State University, Baton Rouge, LA, USA. July 23-27, 2011.
8. Hands-on DFT Workshop, Materials Research Institute, PSU, PA, USA. June 28th-July 1st, 2011.
9. International Seminar on Theoretical Physics and National Development, National Mathematical Center, Abuja, Nigeria, 2008, 2010.
10. USC and DOE Conference on Emerging Trends in Materials Simulations and Experiments, Terranea Resort in Rancho Palos Verdes, California, USA, 24-26 March 2010.
11. Louisiana Academy of Science, 2010 and 2011.
12. Minerals, Metals and Materials (TMS) Annual Conference and Exhibition, San Francisco, California, USA, 15th-19th Feb. 2009.
13. Sub-Saharan Workshop on Mathematical Analysis and Optimization, International Center for Theoretical Physics, Trieste, Italy and Maths Dept., Ebonyi State University, Ebonyi, Nigeria: 2005 - 2008.
14. Annual Conferences of Nigerian Institute of Physics (NIP): 2006 - 2008.
15. 29th Annual International Conference of Chemical Society of Nigeria, Lagos, Nigeria, 25-29 Sept. 2006.

REFEREES

Available upon request.