Akande Taiwo

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Objective: Passionate physicist specializing in microfluidic fabrication, nanoparticle manipulation, and photonic materials, with a focus on advancing quantum computing technologies. Seeking to leverage my expertise in theory, simulations, and experiments to drive innovation in quantum information processing and enhance material discovery through machine learning techniques.

EDUCATIONAL INSTITUTES AND ACADEMIC QUALIFICATION WITH DATES:

(i)	Rensselaer Polytechnic Institute. Troy, New York, USA. PhD Physics (Nano and Photonics) in View	Aug 2022 till date
(ii)	Rensselaer Polytechnic Institute. Troy, New York, USA. Master of Science (MSc): Condensed Matter Physics	Dec 2023
(iii)	University of Ado-Ekiti, Nigeria PhD Physics (Theory)	Jan 2023
(iv)	University of Ibadan, Ibadan, Nigeria. Master of Science (MSc): Physics	Feb 2014
(v)	University of Ado-Ekiti, Nigeria. Bachelor of Science (BSc): Physics	Mar 2010

TRAINING & SYMPOSIUM ATTENDED WITH DATES:

- Albany Nanotechnology Symposium (ANS) - Albany Nanotech Complex, Albany, New York, USA (Nov 2023)
  Acquired skills in nanotechnology applications and advancements.
- Summer School on Quantum Information Science - SQMS Center, Fermilab, Chicago, USA (Aug 2023)
  Deepened understanding of qubits, superconductor fabrications, quantum information science principles and applications.
- Foundation Postgraduate Course in Relativistic Astrophysics - National Mathematical Center, Abuja, Nigeria (April 2019)
  Explored advanced concepts in relativistic astrophysics.
- Hands-On Research in Complex Systems School - International Center for Theoretical Physics, Trieste, Italy (Jul 2018)
  Gained practical experience in complex systems research methodologies.
- Advanced School on Applications of First Principles and Molecular Simulations in Physical Sciences - Department of Physics, FUNAAB, Nigeria (Feb 2018).
  Developed proficiency in first principles and molecular simulations techniques.

POSTER & SEMINAR PRESENTATION:

- Leveraging Quantum Phenomenon to Enhance Materials Properties - SQMS, Fermilab, USA (Aug 2023)
  Poster presentation providing insights into utilizing quantum principles for material enhancement.
- Modelling Defect Energy in High Melting Temperature Metals - International Center for Theoretical Physics (ICTP), Trieste, Italy (Jul 2018)
  Seminar presentation on modeling defect energy in metals.
- The Optical Properties of Low Band-gap Semiconductors - University of Ado-Ekiti, Nigeria (Sep 2010)
  Seminar presentation discussing the optical properties of semiconductors.

CONFERENCE:

- Airborne Radiometric Data for Bitumen Exploration in Agbabu Area, Southwest, Nigeria. Organization for Women in Science for the Developing World (OWSD) Nigeria, Jul 2023.
  Detailed importance of the airborne radiometric data for bitumen exploration in the Agbabu area.

AWARDS:

• Rensselaer Polytechnic Institute Graduate Scholarship Award	Aug 2022.
• Rensselaer Polytechnic Institute Raybin Memorial Graduate Supplemental Fellowship.	Aug 2022.
• Ekiti State government postgraduate scholarship award for outstanding Ph.D students	Oct 2018.
• Ekiti State government postgraduate scholarship award for outstanding M.Sc. students.	Oct 2013.
• Ekiti State government undergraduate scholarship award outstanding B.Sc students.	Oct 2007- 2010.

EMPLOYMENT RECORDS:

Teaching & Research Assistant, Department of Physics, Rensselaer Polytechnic Institute, New York, USA. Aug 2022 – Till date

Responsibility:

- Leads Physics courses and conducts research in Microfluidic Fabrication for Nanoparticle Trapping and Manipulation. This includes exploring advanced microfluidic fabrication techniques, COMSOL Multiphysics simulations, and their applications in diagnostics, quantum computing, and biosensing. Contributes to advancements in these fields while fostering interdisciplinary collaboration.

Lecturer, Department of Physics, Ekiti State University, Nigeria. Dec 2019 – Aug 2022

Responsibilities:

- Provided comprehensive instruction in physics courses, mentored students, and fulfilled administrative roles, ensuring the smooth functioning of departmental activities, and fostering academic excellence.

Teaching and Research Assistant, Department of Physics, Ekiti State University, Nigeria. Mar 2016 – Dec 2019

Responsibilities: Teaching & Supervising Undergraduate Students

- Facilitated learning in physics courses, provided mentorship to undergraduate students, and contributed to departmental administration, supporting student academic growth, and ensuring efficient departmental operations.

Physics and Mathematics Instructor, Apostolic Faith Secondary School, Kwara State, Nigeria. Oct 2011 – Mar 2016
Responsibilities:

- Designed and implemented engaging curriculum for physics and mathematics, delivered effective instruction, and provided academic support, fostering a passion for science and mathematics education among secondary school students and contributing to their academic success.

SKILLS: Machine Learning, Python, AutoCAD, COMSOL Multiphysics, Office suite (Microsoft Word, Excel, PowerPoint), Corel suite.

CURRENT RESEARCH FOCUS:

The ongoing research, centered on interaction of light with matter, microfluidic fabrication, and innovative techniques for manipulating nanowires to enhance single-photon properties, is aimed at perfecting the technology for applications in quantum information processing. This includes advancing the capabilities of quantum computing, communication, and sensing, with the goal of achieving more efficient and reliable technologies. Concurrently, I am also engaged in the application of Machine Learning for materials discovery and knowledge discoveries.

Professional Service and Membership:

- Reviewer, Annals of Physics journal — 2023 till date
- Reviewer, em Calphad — 2023 till date
- Member: American Physical Society — 2024 till date
- Member: National Black Society of Physics — 2024 till date

Academic Thesis:

(i) **T.H. Akande.** 2D Magnetic Materials and Machine Learning Predictions. M.Sc Project (Dec 2023).

(ii) **T.H. Akande** Computational Investigations of face centered cubic metals and their binary alloys using Embedded Atom Method (EAM) approach. PhD Thesis (Jan 2023).

(iii) **T.H. Akande.** Characterization of Lorenz-Like Chaotic Systems Using Maximum Lyapunov Exponents Method. M.Sc Thesis Project. (Nov 2013).

(iv) **T.H. Akande.** Characterization and Determination of Thermal Conductivity for Sn(1-x) FexSe Pseudo-binary Alloys Using Lee's Disk. B.Sc. Thesis Project. (Apr 2010).

(v) **T.H. Akande.** Review on: The Optical Properties of Low Band-gap Semiconductors. University of Ado-Ekiti, Nigeria. B.Sc Seminar. (Sep 2010).

Publications:

Year 2024:

(i) Adesakin G.E, F.O. Ogunlana, **Akande T.H** *et al*. (2024). Mean Free Path and Wavelength of Electron at Fermi Level of Metals. Nature and Science. 22 (7): 6 – 14.

(ii) Adesakin G.E, **Akande T.H** *et al*. (2024). Work Function of Metals and Strain based on Brodies Model using Free Electron Theory. Journal of American Science. 20(5). 1 – 8.

(iii) Adesakin G.E, **Akande T.H.** *et al*. (2024). Theoretical Computation of Electron Critical Temperature of Metals based on Bardeen, Cooper Schriffer (BCS) Theory using Free Electron Approximation. 17(5),1– 9. doi:10.7537/marsnys170524.01.

(iv) Adesakin, G. E., **Akande, T. H.**, Edema, O. G. *et al*. (2024). Extension of Mott Formula in the Linearized Boltzmann Transport Equation to the Study of Thermoelectric Power of Electron in Metal. Nigerian Journal of Physics, 33(1), 48–55. https://doi.org/10.62292/njp.v33i1.2024.204

(v) Ogunlana, O.F., **Akande, H.T**., Ojuola, T.A., and Agbele, A.T. (2024). "Use of Airborne Radiometric Data for Bitumen Exploration in Agbabu Area, Southwestern, Nigeria." IOSR Journal of Applied Geology and Geophysics. Vol 12, 2, 09-15

Year 2023

(vi) Adesakin G.E, Akande T.H, Edema O. O. *et al.* (2023). Coherence Length of Electron in Metals and Linear Stain based on Heisenberg Approximation using Free Electron Theory. Rep Opinion;15(12):9-16. ISSN1553-9873(print). Marsland Press. doi:10.7537/marsroj151223.02.

Conference:

(vii) Ogunlana, F.O., and **Akande, T.H.** (2023). "Airborne Radiometric Data for Bitumen Exploration in Agbabu Area, Southwest Nigeria." In Proceedings of the Organization for Women in Science for the Developing World Biennial International Conference, Port Harcourt, Nigeria**.**

Year 2022

(viii) **T. H. Akande**, F. Matthew-Ojelabi, G. S. Agunbiade, G. E. Adesakin, T. A. Ojuola, and A. Fasiku. (2022). Modelling heats of solution for CuNixM(1-x): M = Rh, Sr, and Ir alloys. AIP Advances 12, 015210; doi: 10.1063/5.0065749.

Year 2021

(ix) **T.H. Akande**, F. Matthew-Ojelabi, G.S. Agunbiade, and O.O. Awe. (2021). Embedded Atom Method for Elastic Constants of Iridium Binary Alloys (At room temperature). International Journal of Modern Physics C. https://doi.org/10.1142/S0129183121500753.

(x) G.S. Agunbiade, **T.H. Akande**, F. Matthew-Ojelabi. (2021). A Simplified Semi-Empirical Potential for Simulations of Li, Na, and K Metals and Binary Alloys. Romania Reports in Physics. 73, 505.

(xi) Awe, O. O., Oyelade, E. A., Agbele, A. T., Agunbiade, G. S., and **T.H Akande** (2021). Awareness of Specific Absorption Rate (SAR) value for mobile phone users in Southwestern Nigeria. actaSATECH Journal of Life &Physical Sciences 13 (2): 104 – 112.

(xii) E.B. Faweya, T. Adewumi, Y. Ajiboye, **H.T. Akande**, H.A. Rasheed. (2021). Radon Concentration in Groundwater and Soil Gas Radon in Agbabu Bituminous Deposit Area: Mapping, GR Potential and Health Risks Assessments. Iran J. Sci Technol Trans Sci. https://doi.org/10.1007/s40995-021-01094-4.

Year 2020

(xiii) G.S. Agunbiade, F. Matthew-Ojelabi, **T.H. Akande**, I.A. Ogundare, O.O. Awe. (2020). Thermodynamic and Structural Properties of HCP Metals and Binary Alloys. Romanian Journal of Physics. 65, 611.

(xiv) Fatigun, A.T., Faweya, E.B., Ogunlana, F.O., **Akande, T.H**. (2020). Electricity Generation Potential and Energy Cost of Wind Conversion Systems in Ikeja Southwest Nigeria. Vol. 28(4). Pertanika Journal of Science and Technology. (Malaysia).

Year 2019

(xv) **T.H Akande**, F. Matthew-Ojelabi, G. Agunbiade, and E. Faweya. (2019). Thermodynamic Properties of V, Cr, Mo, Fe, and their Binary Alloys. Turkish Journal of Physics 43(6): 606 – 617. 10.3906/fiz-1906-12. (Turkey).

(xvi) Adesakin, G.E, **Akande, T.H**, Olubosede, O, Edema, O.G, Akinbolusere, A.O, Aliyu, E.O, Adekoya, M.A, Fatigun, A. (2019). Current Density, Electron Mobility, And Drift Velocity of Metals. Jour. of Adv Research in Dynamical & Control Systems 11(6): 1986 – 1995. (USA).

(xvii) Adesakin, G.E, Olubosede, O, Fatigun, A.T, Edema, O.G, **Akande, T.H**, Agunbiade, G.S. Aliyu, E.O. (2019). Conclusive Research Design and Development of the Effect of Linear Deformation on Some Debye Properties of Metals. International Journal of Innovative Technology and Exploring Engineering 8(12): 5330-5335.

(xviii) **T.H. Akande**, F. Matthew-Ojelabi, G.S. Agunbiade, E.B. Faweya, and Adeboje A.O. (2019). The Vacancy Energy in Metals Cu, Ag, Ni, Pt, Au, Pd, Ir, and Rh. Physical Science International Journal. 22(3): 1- 12.

(xix) Faweya, E.B, Ayeni, M.J, **Akande, H.T**., and Fatigun, A.T. (2019). Health Risk of Exposure to Radon in Water of Contaminated Soil at Kawo and Magiro Nigeria. Pertanika Journal of Science and Technology 27(3):1091-1103. ISSN: 0128-7680.

Year 2018

(xx) G.S. Agunbiade, F. Matthew-Ojelabi, N.C. Ogbu, and **T.H. Akande**. (2018). Theoretical Calculation of Thermodynamic Properties of Refractory Metals Using a Semi-Empirical Interatomic Potential. IOSR Journal of Engineering. Vol. 08. 75 – 84, ISSN (e): 2250-3021.

(xxi) Faweya, E.B, Adesakin, G.E, **Akande, T.H**, Olowomofe, G.O, Adewumi, T, and Agunbiade, G.S. (2018). Assessment of Excess-life Time cancer Risk and Radioactive Heat Production from Waste Dumpsites in Three Cities in Southwestern Nigeria. International Journal of Low Radiation. 11(1), 23-44. https://doi.org/10.1504/IJLR.2018.098258.

(xxii) Faweya, E.B, Olowomofe, G.O., **Akande, H.T**, Faweya, O., and Adesakin, G.E. (2018). Evaluation of Radon Exhalation Rate and Excessive Lifetime Cancer Risk in Ondo City Southwestern Nigeria. International Journal of Radiation Research. Ref: IJRR-03-250/2. https://doi.org/10.18869/acadpub.ijrr.17.2.371.

(xxiii) E. Babatope Faweya, O. Gabriel Olowomofe, **H. Taiwo Akande**, and T. Adeniyi Adewumi. (2018). Radon Emanation and Heavy-Metals Assessment of Historical Warm and Cold Springs in Nigeria Using Different Matrices. Environ Syst Res. 7:22. https://doi.org/10.1186/s40068-018-0125-x.

Book Chapter:

(xxiv) Faweya, E.B and **Akande, T.H** (2018). Man, and His Energy: A Study in History and Philosophy of Science. (pp 83 – 102). General Studies Unit, University of Ado-Ekiti, Nigeria.

Year 2017

(xxv) F.Matthew-Ojelabi, G.S. Agunbiade, and **T.H Akande**. (2017). Atomistic Simulations of Ta, Mo & W and their Binary Alloys Using Embedded Atom Method and Second Moment approximation of Tight Binding. International Journal of Innovative Research and Advanced Studies. 4(1) ISSN: 2394-4404.

(xxvi) G. E. Adesakin, O. M. Osiele, O. O. Olushola, E. B. Faweya, **T. H. Akande**, E. A. Oyedele, and R. O. Salau. (2017). Effects of Deformation on Strain Energy Density of Metals. International Research Journal of Pure and Applied Physics. Vol.5, No.2, pp.8-18. ISSN 2055-009X (Print).

(xxvii) E.B. Faweya, M.J. Ayeni, G.O. Olowomofe, and **H.T. Akande**. (2017). Estimation of Radiation Exposure in Soils and Organic (Animal) and Inorganic (Chemical) Fertilizers Using Active Technique. Int. J. Environ. Sci. Technol. https://doi.org/10.1007/s13762-017-1574-x.

(xxviii) O.O. Popoola, F.Matthew-Ojelabi, G.S. Agunbiade, G.E. Adesakin, and **T.H. Akande**. (2017). Modified Analytical Embedded Atom Method (Maeam) Interatomic Potentials for Body Centred Cubic (Bcc) Transition Metals and Vacancy Mechanism. International Journal of Scientific Research. Vol. 6 (4), pp.670-673. https://doi.org/10.36106/IJSR.

(xxix) **T.H. Akande**, O.O. Popoola, F. Matthew-Ojelabi, and G.S. Agunbiade. (2017). Characterization of Lorenz-Like System and Estimation of Maximum Lyapunov Exponent. International Journal in Physical and Applied Sciences. Vol. 04. Issue 07. ISSN: 2394-5710.

Article under review

(i) Adesakin, G. E., **Akande, T. H.**, *et al*. (2024). Dependence of Magnetic Energy of Metals on Electron Density Parameters and Linear Strain. Applied Physics A, Manuscript Draft APYA-D-24-01895. (Under Review).

(ii) Adesakin, G. E., **Akande, T. H.,** *et al*. (2024). Ionization Energy of Electron in Metals and Linear Strain. APL Materials. Manuscript submitted for publication.

Ongoing research work:

Microfluidic Fabrication for Nanoparticle Trapping and Manipulation

i. Exploring advanced microfluidic fabrication techniques, including gold electrode development on ITO glass slides and precise assembly of microfluidic cells, for nanoparticle trapping and manipulation. Applications include lab-on-a-chip diagnostics, quantum computing via single-photon sources, and enhanced biosensor and photothermal therapy technologies.

ii. Utilizing COMSOL Multiphysics to simulate electric field distribution and nanoparticle behavior within microfluidic systems. This includes optimizing trapping efficiencies and enhancing particle alignment, with the goal of improving device performance in applications such as quantum computing and biosensing.

Links to scientific publications:

- https://scholar.google.com/citations?hl=en&user=SjeOkiUAAAAJ;
- https://orcid.org/0000-0002-2682-904X;
  Scopus ID: 57211278931
- https://www.researchgate.net/profile/Taiwo-Akande-2;
- https://www.linkedin.com/in/akande-taiwo-hassan-75325a199/.