Divine Philip Kumah Jnr

Employment History & Research Highlights:

- Center for Research in Surface Phenomena, Yale University, New Haven
  August 2009– Present, Postdoctoral Fellow
  - Growth and characterization of epitaxial complex-oxide systems.

- **Roy Clarke Group, University of Michigan, Ann Arbor**
  July 2005 – July 2009
  - Interfacial Structural Studies of thin film Perovskites and Group III-V Semiconductors using the Coherent Bragg Rod Analysis (COBRA) Direct Method Phase Retrieval Method
  Worked on developing a method to image thin-film structures with sub-atomic resolution using synchrotron x-ray sources. This work provides direct structural information for explaining novel observed electronic and optical properties in correlated electron systems and quantum dot structures.

  - Synchrotron experiments performed at Argonne National Laboratory and the Swiss Light Source

  - Work in collaboration with Swiss Light Source group provided first direct structural explanation for the 2D electron gas at the interface between insulating $SrTiO_3$ and $LaAlO_3$

  - Developed the first combination of anomalous diffraction techniques and the Coherent Bragg Rod Analysis method for element-specific structural determination

  - X-ray imaging studies of Ni-based super-alloys for turbine applications
  Worked on a real-time diagnostic technique to image turbine blade components in real-time to detect and understand characteristics which lead to failure.

- **The National Academy of Science, Washington DC**
  17th September 2007 – 30th November 2007
  - Recipient of Christine Mirzayan Science & Technology Fellowship
  Worked on the Global Energy Assessment Study with the National Academies Board on International Scientific Organizations and the H. John Heinz III Center

- **European Particle Physics Research Council, Geneva**
  8th June 2004 – 28th July 2004
  -Investigated the effects of sense wire sags on the resolution of the Muon Detector System for ATLAS and the Large Hadron Collider.

  10th June 2003 – 17th August 2003
  -Investigated a cosmic-ray procedure for rapidly analyzing components of the Muon Detector System for ATLAS and the Large Hadron Collider.

- **National Renewable Energy Laboratory, Golden CO**
  1st June 2002 – 9th August 2002

-Designed a program using Visual Basic to simulate the Atomic Force Microscope. Program implemented by the Measurement and Characterization Department at NREL to identify defects in AFM images and increase the accuracy of these images.

- **Southern University, Baton Rouge, LA**
  January- May, 2002
  -Involved in synthesizing high efficiency electrodes for Lithium- ion cells.

  January- May, 2004
  - Density Functional Theory ab-initio calculations of Electronic Band Structure in Al_2O_3

Education:

University of Michigan, Ann Arbor
- **Degree:** PhD. Applied Physics
- **Date of Graduation:** June 2009
- **Thesis:** 3D Imaging of Buried Quantum Dots using COBRA

- **Degree:** Masters of Science, Electrical Engineering (Solid State)
- **Date of Graduation:** May 2007

Southern University and A&M College, Baton Rouge, LA
- **Degree:** Bachelors of Science, Physics, *Summa Cum Laude*
- **Physics GPA:** 4.0 **Overall GPA:** 3.96
- **Date of Graduation:** July 2004
- **Undergraduate Thesis:** The High Voltage Analysis of Monitored Drift Tube Performance for the ATLAS Muon Spectrometer, May 2004

Honors, Fellowships and Awards:

- Physics and Chemistry of Surfaces and Interfaces Young Scientist Award, January 2009
- Christine Mirzayan Science and Technology Policy Fellowship, 2007
- University of Michigan Applied Physics Graduate Fellowship
- Student Grand Marshall, Southern University, July 2004
- Who is Who in American Colleges and Universities, 2003-2004
- 1st Place, Physics Research Presentation, Beta Kappa Xi, 2004
- 2003 Science and Engineering Academic Excellence Scholarship
- National Collegiate Mathematics Award, 2001-2002
- All American Collegiate Award, 2001-2002
- 2002-2003 College of Sciences Excellence Award
- 2001/2002 Honors College and Junior Division Highest GPA Award
- 2001/2002 Chemistry Excellence Award

Invited Presentations:

- Yale University Center for Research in Surface Phenomena Seminar
  New Haven, CT, Feb, 2009
  - Presentation: *A new x-ray phase retrieval method for imaging buried interfaces*
- Calvin College Department of Physics Seminar
  Grand Rapids, MI, Dec, 2007
  - Presentation: *Imaging Interfaces with X-rays*

- Swiss Light Source Seminar
  Villigen, Switzerland, July 2007
  - Presentation: *COBRA – A Direct Method for Phase Retrieval*
- Southern University College of Sciences Symposium
  Baton Rouge, LA, May 2007
  - Presentation: *Unlocking Nature's Secrets with X-rays*

Contributed Presentations:

- 2009 Physics and Chemistry of Surfaces and Interfaces, Santa Barbara, CA
  - Presentation: *A new x-ray method to image self-assembled quantum dot structures.*
- 2008 American Physics Society March Meeting, New Orleans LA
  - Presentation: *Anomalous COBRA studies of InGaAs/GaAs.*
- 2007 American Physics Society March Meeting, Denver CO
  - Presentation: *Structure and morphology of (111) textured Au/Co/Au trilayers grown on glass by MBE.*
- 2007 Annual SCOR Conference, Ann Arbor MI
  - Presentation: *Synchrotron Studies of Single Crystal Nickel-based Superalloys*
- 2004 Annual Louisiana Academy of Sciences Conference, Lake Charles LA
  - *High Voltage Analysis of Monitored Drift Tubes for ATLAS*
- 2004 National Conference of Black Physics Students, Washington DC
  - *Cosmic Ray Muon Calibration for ATLAS*
- 2003 Emerge Workshop, Atlanta GA
  - *GradPortal: Bridging Graduate Resources*
    Co-Presented with Dr. Robert Ford, Director LS-LAMP
- 2002 Dirac Centenary Conference, Baylor University, Waco TX
  - *The Effect of Tip Design on Imaging in the Atomic Force Microscope*
- 2002 Honors College State Conference, Lafayette, LA
  - *Quantum Web: A Model for Online Learning*

Skills and techniques:

- X-ray diffraction using synchrotron and lab sources
- Direct methods for x-ray phase retrieval
- Experience with Atomic Force Microscopy and Scanning Electron Microscopy
- Proficient in programming in MATLAB, C, C++, ROOT, SPEC and FORTRAN

Publication List:

- D. P. Kumah, S. Shusterman, Yossi Paltiel, Y. Yacoby and R. Clarke, *Atomic-scale mapping of quantum dots formed by droplet epitaxy*. Nature Nano. PUBLISHED ONLINE: 27 SEPTEMBER 2009

- **D. P. Kumah**, A. Riposan, C. N. Cionca, N. S. Husseini, R. Clarke, J. Y. Lee, J. M. Millunchick, Y. Yacoby, C. M. Schlepütz, M. Björck, and P. R. Willmott . *Resonant coherent Bragg rod analysis of strained epitaxial heterostructures.* Appl. Phys. Lett. 93, 081910 (2008).

- N. Husseini, **D. Kumah**, J. Yi, C. Torbet , D. Arms , E. Dufresne, T. Pollock, J. Wayne Jones, R. Clarke. *Mapping single-crystal dendritic microstructure and defects in nickel-base superalloys with synchrotron radiation* . Acta Materialia , Volume 56 , Issue 17, 4715 (October 2008)
- R. Herger, P. R. Willmott, C. M. Schlepütz, M. Björck, S. A. Pauli, D. Martoccia, B. D. Patterson, **D. Kumah**, R. Clarke, Y. Yacoby, and M. Döbeli. *Structure*

determination of monolayer-by-monolayer grown La1-xSrxMnO3 thin films and the onset of magnetoresistance. Phys. Rev B 77, 085401(Febuary 1 2008)

- C. N. Cionca, A. Riposan, **D. P. Kumah**, N. S. Husseini, D. A. Walko, Y. Yacoby, J. M. Millunchick,and R. Clarke. *Strain and composition mapping of epitaxial nanostructures*. Appl. Phys. Lett. 92, 151914 (18 April 2008)

- J. B. González-Díaz, A. García-Martín, G. Armelles, J. M. García-Martín, C. Clavero, A. Cebollada, R. A. Lukaszew, J. R. Skuza, **D. P. Kumah**, and R. Clarke. *Surface-magnetoplasmon nonreciprocity effects in noble-metal/ferromagnetic heterostructures*. Phys. Rev. B 76, 153402 (5 October 2007)

- P. R. Willmott, S. A. Pauli, R. Herger, C. M. Schlepütz, D. Martoccia, B. D. Patterson, B. Delley, R. Clarke, **D. Kumah**, C. Cionca, and Y. Yacoby. *Structural Basis for the Conducting Interface between LaAlO3 and SrTiO3* .Phys. Rev. Lett. 99, 155502 (9 October 2007)

- D. Boschetto, G. Mourou, A. Rousse, A. Mordovanakis, Bixue Hou, J. Nees, **D. Kumah**, R. Clarke. *Spatial coherence properties of a compact and ultrafast laser-produced plasma keV x-ray source*. Appl. Phys. Lett. 90, 011106 (Jan. 2007)

- **D P Kumah** , R Clarke, A Cebollada, C Clavero, J M García-Martín, J R Skuza and R A Lukaszew. *Atomic layer epitaxy of (111) Au/Co/Au trilayers*. J. Phys. D: Appl. Phys. 40 (April 2007) 2699–2704