

DEPARTMENT OF PHYSICS



Dr. Tannecia Stephenson, BSc, PhD *UWI*
Head of Department

OVERVIEW

Undergraduate curricular reform, staff recruitment and increasing research output were among the primary objectives for the 2016/17 academic year. Additionally, undergraduate forums and outreach activities to high schools and community colleges remain a priority.

Undergraduate Curriculum

The “Physics in Practice Internship” (PHYS3400) course was approved and launched for the 2016–2017 Summer Semester. This 3-credit course introduces students to practical aspects of the working environments in which they may be employed upon graduation. Four students successfully completed the course. A Bachelor of Education Programme (66 credits) was designed in collaboration with the School of Education to meet the demand for an in-service teaching training programme.

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Student satisfaction with teaching continues to be generally high. The number of undergraduate students pursuing introductory and advanced level courses have shown some decline. The Department in partnership with the Mona School of Engineering continues to induct new and returning students with exceptional academic performance into the Physics and Engineering Honours Society. This year 25 Physics students were inducted. Approximately 26 students completed the requirements for majors or minors within the Department. Four students will graduate with First Class Honours.

One member of staff was added to the academic staff complement. Dr. Randy Koon Koon joined with a specialization in Renewable Energy.

Research and Graduate Activity

The five Research Groups are active and continue to attract new grants. Research areas include Statistical and Dynamical Downscaling of Climate Data, Evaluation of Renewable Energy Technologies and modelling Renewable Energy Resources, Examination of the effect of wireless device use on human health in realistic environments, Compact Stars in General Relativity and Astrophysics, BioGlass, Novel Applications of Optics, Human Speech Recognition, Detection of Trace elements in BioSamples and Compartment Fire Dynamics and Modelling.

The Department produced 27 publications, 12 more than the previous year. This suggests a publication rate of 2.5 publications per staff member. Ten of the publications were co-authored by Graduate Students.

Graduate enrolment was 34 Research Students and 22 MSc Students. One PhD was awarded: Kimberly Stephenson; and three MPhil's: Mr. Sameer Simms, Mr. Sanja Simmonds and Mr. Dudley Williams.

Under the Investment Plan for the Caribbean Regional Track of the Pilot Program for Climate Resilience (PPCR) funded by the Inter-American Development Bank, a high performance computing and storage system was acquired at an approximate cost of US\$750,000 and dubbed S.P.A.R.K.S. (Scientific Platform for Applied Research and Knowledge Sharing).

Internships and Exchanges

Under the Caribbean Catastrophe Risk Insurance Facility (CCRIF) Internship programme, postgraduate students Mr. Deron Maitland and Mr. Leaford Henderson received internships to the Climate Studies Group, Mona.

Miss River Providence, a finalizing student with majors in Energy & Environmental Physics and Mathematics participated in a 4 week course in Japanese Studies at the Sophia University in Tokyo.

Outreach and Public Service

The Department hosted its Annual CAPE Workshop for high school students. The workshop was held at Mona Campus on January 9–13, 2017 and at Western Jamaica Campus on January 5–6, 2017. Over 1000 sixth form students attended from over 30 high schools. Throughout the year, the Department accommodated visits from high schools to facilitate laboratory exercises. The Department continues to actively participate in varied Outreach Activities of the Faculty and University. These include Research Days 2017, Relay for Life 2017 and “Science in the Home” held at the Maxfield Park Children’s Home.

Pre-Labour Day Activities

Pre-labour day activities were held on Friday, May 19, 2017. Efforts included planting and installation of irrigation in a section of the Physics Quadrangle as well as the commencement of the remarking of the Physics Parking Lot.

Staff Development

Ms. Natalie Mclean and Mr. Andre Gordon successfully completed a Construction Project Leadership workshop at the Mona School of Business Management (MSBM).

The Department hosted its Annual Dinner in December 16, 2016 and its annual Retreat on June 30, 2017.

Recognitions and Awards

- Mr. Chadwick Barclay placed first in the category of ‘Youth’ and received an award for “National Innovation in Science and Technology 2016.” Mr. Barclay developed a navigation aid for the blind as part of his final year project while pursuing a Bachelor of Science in Electronics Engineering. The tool uses speech recognition technology to enable users to request and receive directions to specific landmarks.
- Professor Michael Taylor delivered the Annual Chevening Lecture for the British High Commission on October 5, 2016. The title of the lecture was “Climate Change and Development”. Professor Michael Taylor was also selected as one of the Coordinating Lead Authors for Chapter 3 (Impacts of 1.5°C global warming on natural and human systems) in the IPCC Special Report on Global Warming of 1.5°C.)
- Miss Marva Anderson was acknowledged on December 13, 2016 for 21 years of service to the Department of Physics.
- The UWI Annual Research Day Awards Ceremony was held on February 3, 2017. Recipients of awards included:
 - Dr. Andre Coy, Dr. Dale Rankine and Professor Michael Taylor – Best Research Publication
 - Dr. Venkateswara Penugonda – Most Outstanding Researcher
 - Professor Michael Taylor – Research Project attracting the Most Research Funds
- Drs. Louis-Ray Harris and Venkateswara Penugonda were featured in the UWI Research for Development 2017 Publication. The research efforts of Drs. Louis-Ray Harris and Tanya Kerr were highlighted in the UWIMONA Gleaner supplements. Mr. Yekini Wallen-Bryan was also featured in relation to his Plug-N-Pree innovation. Mr. Wallen-Bryan created a *device that can control, monitor, and economize electricity usage remotely using a smartphone. The device also features motion sensor technology to support the user’s home security.*
- Dr. Penugonda was recognized by the International Institute of

Education and Management in New Delhi, India for his teaching accomplishments.

- Dr. Andre Coy was elevated to the level of Senior Member of the IEEE.
- Dr. Kimberley Stephenson was officially awarded her PhD Degree in March 2017. Her thesis entitled “Modelling the Impact of Climate Change on a Dry Forest Fauna”, supervised by Professors Michael Taylor and Byron Wilson.
- Mrs. Rosalene Simmonds completed a Master of Science in Human Resource Development.

Fullbright Scholarships were awarded to four UWI graduates for commencement of their Ph.D research in 2017/2018. Three of the four awardees were from the Department of Physics. Ms. Jhordanne Jones will pursue a Ph.D. in Atmospheric Science with a focus on tropical cyclones and meteorology at Colorado State University. Ms. Joni Hall will pursue a PhD in Energy Studies and Engineering at the University of Tennessee, Knoxville. Mr. Daren Watson will pursue a Ph.D. in Engineering at the University of Central Florida. Miss Savanna Lloyd was the recipient of a scholarship to pursue MSc. studies in Japan.

Ms. Phylcia Ricketts was one of the top three Oral Presenters in the Post Doctor/Student session at the Commonwealth Science Conference held in Singapore in June 2017. She also received The Royal Society travel grant valued up to £6000 to conduct research at any commonwealth country.

Departmental Statistics

Total Undergraduate Student Registrationsm (See table on page 415).

Postgraduate Student Enrolment

There are twenty-nine (29) students (F/T and P/T) enrolled in MPhil Programmes and six (6) students enrolled in PhD Programmes. There are twenty-two M.Sc. students (across all years).

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Table 1: Total Undergraduate Student Registrationsm

	Semester 1		Semester 2		Year Totals	
	Current	Previous	Current	Previous	Current	Previous
Preliminary	88	86	54	65	142	151
Intro Physics	94	120	84	93	178	213
Intro Engineering (for Electronics & Computer Science)	–	–	4	–	4	–
Intro Electronics	51	48	107	65	158	113
Year II	115	261	126	213	241	474
Year III	63	128	75	139	138	267
Total	411	643	450	575	861	1218

Prizes Awarded

The following undergraduate students were recipients of Departmental Prizes.

- The Professor John Lodenquai Prize for Introductory Physics: Mr. Andrew McCartney;
- Level II – Departmental Prizes: Mr. Delando Grant and Miss River Providence;
- Michael Tharmanathan Physics Bursary: Mr. Isaac Alfred.

UWI Postgraduate Scholarships

Nine (9) postgraduates were awarded scholarships to read for their M.Phil. and Ph.D. Degrees. These included Mr. Barrington Brevitt, Dr. Adwalia Fevrier-Paul, Mr. Davaugh Sanderson, Mr. Karlus Redway, Mr. Sanchez Palmer, Miss Savannah Lloyd and Mr. Daren Watson. Returning students on scholarship are Mr. Alton Daley and Mr. Darrion Walker.

Significant Funding

- State of the Climate Jamaica 2016. Pilot Programme for Climate Resilience (PPCR): Jamaica (2017). US\$25,000.
- State of the Climate Caribbean 2016. Caribbean Development Bank (CDB) (2017). EU\$250,000.
- The Caribbean 1.5 Project. Caribbean Development Bank (CDB) (2017). US\$40,000.
- US Virgin Islands Climate Change Vulnerability Assessment. US Department of Interior Grant Award Number D18AP0048 (2017). US\$250,000
- National Climate Change Conversations. United Nations Development Programme (UNDP) (2017). US\$10,000.

PUBLICATIONS

Book Chapters

- **M. A. Taylor, J. Jones and T. Stephenson**, 2017: Climate Change and the Caribbean: Trends and Implications. In *Climate Change and Food Security: Africa and the Caribbean*. Elizabeth Thomas-Hope (ed). Routledge Publishers.
- K. Rhiney, A. Eitzinger, A. Farrell and **M. A. Taylor**, 2017: Assessing the Vulnerability of Caribbean Farmers to Climate Change Impacts: A Comparative Study of Cocoa Farmers in Jamaica and Trinidad. In *Climate Change and Food Security: Africa and the Caribbean*. Elizabeth Thomas-Hope (ed). Routledge Publishers.

Journal Articles

- V. Himarnaheswara Rao, P. Syam Prasad, **V. Penugonda**, L. F. Santos, N. Veeraiah, 2016: Influence of Sb203 on tellurite based glasses for photonic applications, *Journal of Alloys and Compounds* 687 (2016) 898-905, <http://dx.doi.org/10.1016/j.jallcom.2016.06.256>
IF 3.133

- **P. Ricketts**, N. Basu, H. Fletcher, **M. Voutchkov**, B. Bassaw, 2016: Assessment of fish consumption and mercury exposure among pregnant women in Jamaica and Trinidad & Tobago. *Chemosphere*. <http://dx.doi.org/10.1016/j.chemosphere.2016.08.054> **IF 3.137**
- N. A. Mahammedia, **M. Ferhat**, R. Belkada, 2016: Prediction of indirect to direct band gap transition under tensile biaxial strain in type-I guest-free silicon clathrate Si₄₆: *A first-principles approach, Superlattices and Microstructures* <http://dx.doi.org/10.1016/j.spmi.2016.09.026>, **IF: 2.117**
- D. Martínez-Castro, A. Vichot-Llano, A. Bezanilla-Morlot, A. Centella-Artola, **J. Campbell** and C. Vilorio-Holguin, 2016: Performance of RegCM-4.3 over the Caribbean region using different configurations of the Tiedtke convective parameterization scheme. *Revista De Climatologia* Vol 16 pp 77–98. URL: <http://webs.ono.com/reclim11/reclim16f.pdf>
- **T. J. Kerr**, **L. Myers**, K. Duncan, 2017: Raman Microspectroscopic Mapping: A Tool for Identification of Fused Materials in Fire Debris. *Journal of Forensic Sciences*. DOI: 10.1111/1556-4029.13417. **IF 1.127**
- E. Margui, **P. Ricketts**, H. Fletcher, A. Karydas, A. Migliori, J. Jose Leani, M. Hidalgo, I. Queralt, **M. Voutchkov**, 2017: Total Reflection Fluorescence as a Fast Multielemental Technique for Human Placenta Sample X-Ray. *Spectrochimica Acta Part B: Atomic Spectroscopy*. dx.doi.org/10.1016/j.sab.2017. **IF 2.098**
- **P. Ricketts**, H. Fletcher, **M. Voutchkov**, 2017: Factors Associated with Mercury Levels in Human Placenta and the Relationship to Neonatal Anthropometry in Jamaica and Trinidad & Tobago. *Reproductive Toxicology*. DOI: 10.1016/j.reprotox.2017.04.008. **IF 2.850**
- **D. Watson**, **Y. Binnie**, K. Duncan, J.F. Dorville, 2017: Photurgen: The Open Source Software for the Analysis & Design of Hybrid Solar Wind Energy Systems in the Caribbean Region. A brief introduction to its development policy. *Energy reports*. <http://dx.doi.org/10.1016/j.egyr.2017.03.001>.

- **R. Koon Koon**, I. Haraksingh, L. Ufondu, 2017. Preliminary Findings into Thermal Properties of Specific Stratigraphy for Geothermal Energy Prospecting Along the Williston Basin. *Universal Journal of Geoscience*, Vol. 5(4), 91–8. DOI: 10.13189/ujg.2017.050402.
- **M. Taylor, K. A. Stephenson**, 2017: Impacts of Climate Change on Sea Temperature in the Coastal and Marine Environments of Caribbean Small Island Developing States (SIDS), Caribbean Marine Climate Change Report Card: *Science Review* 2017, pp 23–30.
- P. Buckley, B. Townhill, U. Trotz, K. Nichols, P. Murray, C. Clarke, A. Gordon, **M. A. Taylor**, CMEP (2017), Caribbean Marine Climate Change Report Card 2017. *Commonwealth Marine Economies Programme*, 12 pp.
- **R. K. Stennett-Brown, J. J. P. Jones, T. S. Stephenson, M. A. Taylor**, 2017: Future Caribbean temperature and rainfall extremes from statistical downscaling. *Int. J. Climatol.* doi:10.1002/joc.5126. **IF 3.609**
- **D. Walker, M. Voutchkov**, C. McKenzie, H. Barned, 2016: Radiation Safety Standards for X-Ray Facilities: Protocol for Plain Radiography Authors: DOI: 10.7727/wimj.2016.200 *West Indian Medical Journal* <http://myspot.mona.uwi.edu/fms/wimj/article/2938>. **IF 0.224**
- **D. C. Walker**, W. D. Aiken, S. Shah, **M. K. Voutchkov**, L.-G.M. Burnett, A. Gordon, C. A. McKenzie, 2017: Radiation Dose Distribution for Patients Undergoing Routine Radiological Scans for Kidney Stone Diagnosis at the University Hospital of the West Indies. *West Indian Medical Journal*. DOI: 10.7727/wimj.2016. **IF 0.224**
- **T. S. Stephenson, M. A. Taylor**, A. R. Trotman, C. J. Van Meerbeeck, A. O. Porter, S. Etienne– LeBlanc, M. Hernández, I. T. Gonzalez, V. Cutié, D. Boudet, C. Fonseca, S. Willie, J. M. Spence, K. Kerr, G. Tamar, **R. Stennett-Brown** and **J. D. Campbell**, 2017: [Regional Climates] Caribbean [in State of the Climate in 2016]. *Bull. Amer. Meteor. Soc.*, 98 (8), S93-S98, doi: 10.1175/2017BAMS StateoftheClimate. **IF 7.929**

- **T. S. Stephenson, J. P. Jones**, 2017. The impact of climate change on extreme events in coastal and marine environments of Caribbean Small Island Developing States (SIDS). Caribbean Marine Climate Change Report Card: *Science Review* 2017, pp 10–22
- W. J. Gutowski Jr., F. Giorgi, B. Timbal, A. Frigon, D. Jacob, H.-S. Kang, K. Raghavan, B. Lee, C. Lennard, G. Nikulin, E. O'Rourke, M. Rixen, S. Solman, **T. Stephenson**, F. Tangang 2016: WCRP COordinated Regional Downscaling EXperiment (CORDEX): a diagnostic MIP for CMIP6. *Geosci. Model Dev.*, 9, 4087-4095. **IF 3.458**
- M. Loucif Seiad, V. K. Mkuppuswamy, Y. Cao, R. Gronheid, **M. Ferhat**, 2017: Dynamic behaviour in the self-assembly process of cylindrical phase PS-b-PMMA block copolymer. Materials Science in *Semiconductor Processing*, Vol 66, pp.26. <http://doi.org/10.1016/j.mssp.2017.03.035>, **IF: 2.264**
- **R. Koon Koon**, L. Ufondu, 2017: “Mathematical Modelling of the Thermomechanical effect of Geofluid on Fracture walls.” *Universal Journal of Geoscience*, Vol5(3), 73– 82. DOI: 10.13189/ujg.2017.050304.
- T. Satyanarayana, M. Vasu Babu, G. Nagarjuna, D.V. Rama Koti Reddy, **P. Venkateswara Rao**, P. Syam Prasad, 2017: Structural investigations on P2O5-CaO-Na2O-K2O: SrO bioactive glass ceramics. *Ceramics International* 43, 10144–10150, ISSN: 0272-8842. **IF: 2.758**
- V. Himamaheswara Rao, P. Syam Prasad, M.Mohan Babu, **P. Venkateswara Rao**, T. Satyanarayana, Luís F. Santos, N. Veeraiah, 2017: “Spectroscopic studies of Dy³⁺ ion doped tellurite glasses for solid state lasers and white LEDs” *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 188, 516–524, ISSN: 1386-1425. **IF: 2.536**
- L. Srinivasa Rao, **P. Venkateswara Rao**, M.V.N.Vasu Deva Sharma, N. Veeraiah: “J-O parameters versus photoluminescence characteristics of 40Li2O-4MO (MO=Nb2O5, MoO3 and WO3)-55B2O3:1Nd2O3 glass systems” *Optik* 142 (2017) 674–681, ISSN: 0030-4026, **IF: 0.742**

- F. Goumeidane, M. Iezid, B. Melik, K. Ouannes, M. Legouera , M. Poulain, T. Satyanarayana, P. Syam Prasad, **P. Venkateswara Rao**, 2017: “Influence of molybdenum oxide on structural, optical and physical properties of oxychloride glasses for nonlinear optical devices” *Ceramics International* 43, 11305–11311, ISSN: 0272-8842.s **IF: 2.758**
- L. Srinivasa Rao, **P. Venkateswara Rao**, T. Venkataappa Rao, Sd. Naheed “ Structural and Optical properties of Zinc magnesium oxide nanoparticles Synthesized by Chemical co-precipitation” *Materials Chemistry and Physics* 203 (2017) 133–140, ISSN: 0254-0584 **IF: 2.084**
- V. Himamaheswara Rao, P. Syam Prasad, M.Mohan Babu, **P. Venkateswara Rao**, G Nagaraju, Luís F. Santos, N. Veeriah: ” Luminescence properties of Sm³⁺ ions doped heavymetal oxide tellurite-tungstate-antimonateglasses” <http://dx.doi.org/10.1016/j.ceramint.2017.09.028>. **IF: 2.536**

CONFERENCE PROCEEDINGS

- **L.R. Harris**, “SAR Computation for Multiple Wearable Antennas”, *Proceedings of Progress In Electromagnetics Research Symposium (PIERS) 2016*, Shanghai, China, pp. 4040–4083, August 2016.
- P. Green, R. Marxer, S. Cunningham, H. Christensen, F. Rudzicz, M. Yancheva, **A. Coy**, M. Malavasi, L. Desideri, F. Tamburini, *CloudCAST – Remote Speech Technology for Speech Professionals*. In *Proceedings of Interspeech 2016*.
- R. Belkada, N.A. Mahammedi and M. Ferhat “ A comparative study of the effect of strain on the Electronic and Optical Properties of filled and unfilled Ba₈Si₄₆ type-I clathrate” *The 3rd International Conference on Computational and Experimental Science and Engineering, ICCESN2016*, Kemer-Antalya, Turkey.

PUBLIC SERVICE

Andre Coy

- Member, International Speech Communication Association
- Convener, Physics Panel for Caribbean Examination Council
- Reviewer Journals, *IEEE Transactions on Audio, Speech and Language Processing, Computer Speech and Language, Instrumentation Science & Technology*
- Member IEEE Signal Processing Society
- Member IEEE Communications Society
- Member STEM Integration Committee – Ministry of Education
- Advisor to the Ministry of Education – Core Curriculum Unit

Victor Douse

- Chairman, Cement Technical Committee, Bureau of Standards
- Technical Assessor, Jamaica National Agency for Accreditation (JANAAC)
- Chairman, Aggregates Technical Committee
- Vice Chairman, Building and Associated Materials Committee.

Louis-Ray Harris

- Member IEEE Electromagnetic Compatibility Society
- Member IEEE Antennas and Propagation Society
- Reviewer, *International Journal of microwave and Wireless Technology*
- Member, Scholarship Award Committee for Government of Japan
- Member, Programme Council, Faculty of Electrical Engineering, Silesian University of Technology, Poland

Leary Myers

- Chairman, Town and Country Planning Advisory
- Member, Board, Transport Authority

Tanya Kerr

- Member, Board, Editorial Advisory Journal, ‘Sample Preparation’ de Gruyter open

Tannecia Stephenson

- Member, CORDEX Science Advisory Team, Joint Scientific Committee of the World Climate Research Programme (WCRP);
- Member, Task Team on Guide to Climatological Practices (TT-GCP) of the World Meteorological Organization (WMO) Fifth Open Panel of the Commission for Climatology (CCI) Experts (OPACE 5)
- Reviewer Journals: *International Journal of Climatology*, *Journal of Climate*

Michael Taylor

- Member, Board, Water Resources Authority
- Member, Climate Change Advisory Board, Ministry of Land, Water, Environment and Climate Change
- Member, International Science Panel of VAMOS/CLIVAR
- Member, Steering Committee, Pilot Project on Climate Resilience (Caribbean)
- Reviewer Journals: *Journal of Geophysical Research*, *International Journal of Climatology*, *Journal of Climate*, *Climate Dynamics*, *Theoretical and Applied Climatology*, *Tellus A*.

Mitko Voutchkov

- Member, Board, International Centre for Environmental Nuclear Science (ICENS)
- Member, Jamaica’s Energy Council, Ministry of Science Technology, Energy and Mining
- Life Member, International Society of Environmental Geochemistry and Health
- Chairman, Technical Advisory Committee “In-situ Methods for Characterization of Contaminated Sites”, International Atomic Energy Agency (IAEA)

Department of Physics

- IAEA Technical Co-operation Expert in Nuclear Physics
- IAE Regional Co-ordinator of medical Physics Programme

Venkateswara Penugonda

- External Examiner in Physics Division, UTech
- Member, Materials Research Society (MRS)
- Reviewer *Journal of Radiation Research and Applied Sciences, Materials Science-Poland and Spectroscopy Letters.*
- Member, *Journal of Engineering* Publication House