

## DEPARTMENT OF PHYSICS

**Dr. Joseph Skobla, MSc, PhD, TU Bratislava/U of Toronto**  
– Head of Department

### WORK OF THE DEPARTMENT

**D**uring the 2007/8 academic year the department sought to broaden and strengthen its course offerings. It achieved some of its objectives and made progress towards moving forward with others. The outreach programme was successfully launched, a new laboratory designed and constructed, and constructive cross-campus discussions held on collaborative research and new teaching programmes.



Though crippled by inadequate academic staffing which deteriorated significantly towards the end of the year, and ongoing infrastructural paucities, the Department however, successfully hosted its 60<sup>th</sup> Anniversary Homecoming Conference, July 11-12, 2008, which was organized by Dr. Michael Taylor, with participants/graduates from the Caribbean and the United States. The launch of a Physics Alumni Society resulted in the compilation of a database of over 200 graduates. The Climate Studies group benefited significantly from the world wide recognition of the work by some of its members; they have presented over fifteen refereed journal and conference papers.

### Course Development

The academic year 2007-2008 presented an opportunity for the Department to focus on the development of its curricula resulting in the introduction of a major in Materials and Nuclear Sciences. Key thrusts also incorporated: revision and reintroduction of the MSc in Digital Technology course; revisitation of the MPhil in Alternative Energy; and the construction of a state of the art Virtual Laboratory

Through joint collaboration with the Electronics Unit, the Department was able to provide internship and practical experiences for undergraduate applied Physics students through summer projects and placements in Industries such as Digicel.

An MOU was signed between Wigton Wind Farm Ltd, The Centre for Excellence in Renewable Energy and the UWI through the Physics Department to amalgamate research efforts in Renewable Energy, to provide training opportunities to students, and to improve their marketability. Advanced discussion is underway for the creation of an MOU with McMasters University, Canada, for collaboration and benchmarking of our Medical Physics Programme.

### **Outreach**

Fruition came to the Department from its efforts to develop within the secondary school system, an appreciation for Physics, with the second CAPE Workshop being hosted in January 2008 through the efforts of Dr. Ponnambalam and others. This incorporated students from twenty two (22) secondary high schools, an increase from nineteen (19) in its first year. Much effort is being made to introduce a practical component to the course and collaboration is being sought with selected industries. The department in October 2007 had its Outreach programme involving the primary and preparatory schools through workshops, using lively Physics demonstrations and experiments to show that Physics is fun. The department also included the general public in its outreach activities through a Science Fair organized by the Scientific Research Council in October 2007 and Research Day organized by the UWI. The Climate Studies group had 3 environmental expos during the year.

### **Teaching**

The ongoing shortage of academics intensified in 2007/8, as three Lecturers did not seek an extension of their contracts. This saw the number for academic staff at the end of 2007/8 being twelve (12) full-time, with five (5) part-time appointments. Students' assessment of teaching and the undergraduate courses offered was satisfactory. The average student evaluation for undergraduate courses was  $4.08 \pm 0.49$  for lecturers and  $3.79 \pm 0.34$  for courses.

The department is attempting to re-evaluate some of its outdated policy decisions which currently exist in order to fulfill the growing demands to offer exceptional teaching and reference guide. For example, the procedure for the recruitment of academic and technical staff in terms of the career path of the applicant needs to be revised. The objective is to introduce professional chairs in Physics which would create a positive impact on teaching, research, co-operation with foreign institutions and attract research funds.

## **Staff Development**

Dr. Karol Grondzak hosted a seminar on “How to solve time-consuming scientific problems on computers” at the Department of Mathematics, UWI, September 21, 2007.

Dr. Paul Aiken hosted a Workshop at Clarendon College High School on November 28, 2007 to demonstrate the capabilities of LabPro device for CXC Physics experiments.

Drs. P. Aiken, M. Taylor and M. Ponnambalam hosted a successful weeklong workshop on Motion in 1 and 2 Dimensions – Unit 1, Operational Amplifiers – Unit 2, for CAPE students from 23 high schools, January 7-11, 2008

Dr. M. Voutchkov and Mr. V. Douse developed and demonstrated a model for the heat shield coating material “KOOLKAT” for Spectrum at the Trade Fair, National Arena September 27-30, 2008, thus establishing an important link with the private sector in the field of Material Science.

## **Targets for 2008/9**

The Department’s key objectives for the period 2008/9 include the following: the introduction of a new minor in Medical Physics and to upgrade it to a major for the next academic year; to make the Virtual Lab fully functional; upgrade laboratories and infrastructure and recruit 4 academic staff members to replace those who left the department. Constructive discussions arose at the Cross Campus meetings in April 2008 to explore collaborative research and taught masters’ programmes and it was agreed to prepare syllabuses to launch an M.Sc in Alternative Energy in 2009.

## **PAPERS PRESENTED**

- Aiken, P. (2008): “Demand and Supply for Science and Technology Teachers at the Secondary and Tertiary Levels within Jamaica and the wider CARICOM region.” . IEEE International Conference, Munich, Germany, November 9-11, 2007.
- **Chen, A.A., and T.S. Stephenson** “Climate Change Renewable Energy and Small Islands”. CARICOM Workshop

on Renewable Energy in the Caribbean – Realities and Perspectives. Tobago, September 25-28, 2007.

- **Stephenson T.S.**, C.M. Goodess, M.R. Haylock, **A.A. Chen** and **M.A. Taylor**, 2008: Detecting Inhomogeneities in Caribbean and Adjacent Caribbean Temperature Data Using Sea Surface Temperatures, *Eos Trans. AGU*, 89 (23), Jt. Assem. Suppl., Abstract A31A-20
- **Watson R.A.**, **M.A. Taylor**, **T.S. Stephenson**, **J.D. Campbell**, 2008: Tl: Future Climate in Jamaica Deduced from Climate Models, *Eos Trans. AGU*, 89 (23), Jt. Assem. Suppl., Abstract GC43A-16.
- **Campbell J.D.**, **M.A. Taylor**, **T.S. Stephenson**, and **R.A. Watson**: Validating the PRECIS regional climate model for the Caribbean, 2008: Eighth Bi-annual Conference of the Faculty of Pure and Applied Sciences, University of the West Indies, Mona, February 26-28, 2008.
- **Watson R.A.**, **M.A. Taylor**, **T.S. Stephenson** and **J.D. Campbell**, 2008: Jamaica's future climate deduced from climate models. Eighth Bi-annual Conference of the Faculty of Pure and Applied Sciences, University of the West Indies, Mona, February 26-28, 2008.
- **Batchelor T.W.**, **A.M.D. Amarakoon** and **M.A. Taylor**, 2008: The effect of temperature and precipitation on Dengue-outbreaks in the Caribbean, using wavelet analysis. Eight Bi-annual Conference of the Faculty of Pure and applied Sciences, University of the West Indies, Mona, February 26-28, 2008.
- **Ponnambalam, M.** "Global Warming, or Global Warning?" American Association of Physics Teachers Meeting, Edmonton, Canada, July 19-23, 2008.
- **Stephenson T.S.**, (2007): "Interpreting Climate Change Simulations: Capacity Building for Developing Nations." Abdus Salam International Centre for Theoretical Physics and the World Climate Research Programme. Trieste, Italy.
- **Clarke L** and **J.Skobla** "A Microntroller Cellular Based Network for GPS Tracking Systems in Jamaica", 21<sup>st</sup> Annual

Conference on Science and Technology, Kingston, Jamaica, November 20 -22, 2007

- Amarakoon A. M. D. Alternative Energy Options in Jamaica: Physics Homecoming Conference; July 11-12, 2008, UWI, Mona Campus
- Arpita Mandall, **M. Voutchkov**, R. Maharaj and M. Madourie, “Geochemistry of soils around the Cement Factory in Kingston, Jamaica”. 8<sup>th</sup> Conference FPAS, UWI, Feb. 26-28, 2008
- Kameaka, J., Duncan, H. Reid and **M.Voutchkov**, “Lead concentrations in blood donors in Jamaica”, 8<sup>th</sup> Conference, FPAS, UWI, Feb 26-28, 2008.
- Mitko Voutchkov, “Application of nuclear physics for advanced materials research”. (Physics). 8<sup>th</sup> Conference FPAS, UWI, Feb. 26-28, 2008

## PUBLICATIONS

### Books and Monographs

- \* C. Heslop-Thomas, W. Bailey, **D. Amarakoon, A. Chen, S. Rawlins, D. Chadee, R. Crosbourne, Owino, K. Polson, C. Rhoden, R. Stennett, M.A. Taylor**, 2008. “Vulnerability to dengue fever in Jamaica”. in Climate Change and Vulnerability edited by N. Leary, C. Conde, A. Nyong and J. Pulhin. Earthscan, London, UK, pp 398-415.
- \* Grondzak K., (2007): “The new model in LMS Moodle”. ITlib. Centrum VTISR, ISSN 1336-0779. Slovak Magazine
- \* **Taylor, M.A. (PL), A.A. Chen**, S. Rawlins, C. Heslop-Thomas, **A.M.D. Amarakoon**, W. Bailey, D. Chadee, S. Huntley, **C. Rhoden** and **R. Stennett** (2008), “Adapting to dengue risk – what to do?” in Climate Change and Adaptation edited by N. Leary, et al Earthscan, London, UK. pp 279-295.
- \* N. Leary, I. Burton, J. Adejuwon, V Barros, P. Batimaa, B. Biagini, S Chinvanno, R. Cruz, D. Dabi, A de Comarmond, B. Dougherty, P. Dube, A. Githeko, A. Abou Hadid, M. Hellmuth, R. Kangalawe, J. Kulkarni, M Kumar, R. Lasco, M. Mataka, M. Medany, M. Mohsen, G. Nagy, M. Njie, J. Nkomo, A, Nyong, B. Osman, E. Sanjak, R. Seiler, **M. Taylor, M.**

Travasso, G. von Maltitz, S. Wandiga, and M. Wehbe, 2008. "A Stitch in Time: General Lessons from Specific Cases. A Synthesis of Adaptation Findings from the AIACC Programme. In N. Leary, J. Adejuwon, V. Barros, I. Burton and R. Lasco (Editors), Climate Change and Adaptation. Earthscan, London, UK. pp 1-27

### Refereed Journal Articles

- \* **A.M.D. Amarakoon, A. A. Chen**, S. Rawlins, D. Chadee, **M. Taylor, R. Stennett**, 2008: "Dengue Epidemics in the Caribbean-Temperature Indices to Gauge the Potential for Onset of Dengue," *J. of Mitig. Adapt. Strat. Glob. Change*, pp 13: 341-357.
- \* Robert, G., Gerald C. Lalor, John Preston, **M. K. Voutchkov**, 2008: 'Variation in geochemical background levels for Jamaican soils" in *Geochemistry Exploration, Analysis*, Vol. 8, No. 2, pp 149-156(8)
- \* **Stephenson, T.S., A.A. Chen** and **M.A. Taylor** 2008: "Toward the development of prediction models for the primary Caribbean Dry Season". *Theoretical and Applied Climatology*, Vol 92, Issue 1-2, pp 87-101(15), DOI 10, 1007/s00704

### Funding

Generating Climate Change Scenarios for the Caribbean for the 2100s using the PRECIS regional model. US\$6,000 from Campus Research and Publications, UWI (2007).

### INCOME GENERATION

During the year 2007/2008 the department generated the following income:

**Dr. J. Skobla** and **Dr. Mitko Voutchkov** received a research grant award from the International Atomic Energy Agency (IAEA) to support the project JAM004, "Development of National Capacity for Applications of Nuclear Science" in the amounts of US\$284,720, for the period 2009-210.

**Dr. Mitko Voutchkov** received US\$3500 research grant from IAEA for the interregional ARCAL project RLA60601, “Training and Updating of Knowledge in Medical Physics” (2009-2011).

**Dr. T. Stephenson** received approval for work to be done on a Research Fellowship, “Caribbean Climate Dynamics and Global Warming: A Regional Climate Model Intercomparison Project”. The amount of the grant is not yet available.

The income generated from the MSc Digital Technology programme is \$4.2 million and the Coordinator is **Dr. Joseph Skobla**.

The income generated for Summer School \$789,381.00, Consultation \$805,399.05, and Departmental activities \$301,240.00

Generating Climate Change Scenarios for the Caribbean for the 2100s using the PRECIS regional model (US\$6K). Research and Publication Awards, UWI (2007).

## **PUBLIC SERVICE**

### **P. Aiken**

- CAPE Workshop Co-organizer
- Member, UTech Appointment Committee
- Chair, Education Activities, IEEE Section

### **V. Douse**

- Chairman, National Cement Technical Committee, Bureau of Standards

### **J. Skobla**

- Reviewer, World Scientific Publishing House, Singapore. International Journal of Neural Systems.
- Reviewer, IEEE, Intelligent Transportation
- Convener, Caribbean Advanced Proficiency Examination (CAPE)
- Chair, Physics Panel

### M. Taylor

- Reviewer, Journal of Geophysical Research, Atmospheres and the Journal of Climate.
- External Examiner, CASE

### M. Voutchkov

- Council member, Jamaica Society of Scientists and Technologists
- Member, BSJ/NEPA Phosphate Technical Committee
- Member, SRC Product Research & Development Sub-Committee Board
- Life Member, International Society of Environmental Geochemistry and Health
- TC Expert in nuclear science of the International Atomic Energy Agency
- Reviewer, West Indian Medical Journal (WIM) The Jamaican Journal of Science and Technology

## INFORMATION ON STUDENTS

The department offered a total of 17 undergraduate courses in 2007/8 with an enrolment of 572 in Semester 1 and 497 in Semester 2. The number of students in undergraduate courses for Semesters 1 and II are shown below:

Total Student Enrolment in physics courses.

<b>Year</b>	<b>Semester I</b>	<b>Semester II</b>	<b>Year Total</b>
Intro & Prelim	268	241	509
Year 2 courses	142	144	286
Year 3 courses	162	112	274
<b>Semester Total</b>	<b>572</b>	<b>497</b>	<b>1069</b>

For postgraduate students the department offered five taught courses. There were 31 post graduate students enrolled in the taught MSc Digital Technology programme in Semester 1 for three of these courses. In Semester 2 the number increased to 34 for all five courses offered. The



taught courses were Solid State Electronic Devices and Applications, Digital Control Systems and Signal Processing, Computer Networks, Digital Communication Links and Project Management Fundamentals. The MPhil programme had an enrolment of 12 students. The areas of study included Electronics, Climate Studies, Materials Science, Microprocessors and Microcontrollers, Statistical Methods in Atmospheric Physics, Astronomy and Cosmology. The postgraduates are being supervised as follows J.Skobla (5 MPhil, 1 PhD); M. Taylor (5 MPhil); A. Amarakoon (3 MPhil); D. Walwyn (3 MPhil), A. Chen (1 MPhil). The department's Summer School 2007/8 offered 6 courses, based on, exam only and taught courses. The 39 students who enrolled were taught by 10 lecturers. Dr. T. Stephenson was the Coordinator.

## **Awards**

**Professor Anthony Chen**, Head of the Climate Studies Group, was part of a United Nations Intergovernmental Panel on Climate Change (IPCC) which was named winner of the prestigious Nobel Peace Prize for 2007. Professor Chen, along with former US VP, Al Gore et al, were awarded for their attempts to increase knowledge about man-made climate change and for laying the framework for counteracting these changes.

Five members of staff were awarded at the Research Day Awards Ceremony as follows:

**The Research Project with the Greatest Business/Economic Development Impact for FPAS – Dr. J. Skobla and Dr. F. Ionica:** Monitoring System of the Hunt's Bay Bridge on Highway 2000".

### **The Best Research Activity for FPAS:**

**Prof. A. Chen and Dr. M. Taylor** "The Scientific Basis of Climate Change as it impacts Small Island Developing States

### **The Best Publication for FPAS:**

**Dr. T. Stephenson, A.A. Chen and M A. Taylor** "Towards the Development of Prediction Models for the Primary Caribbean Dry Season".

## **Prizes**

**Ojay Morrison Level II  
Departmental Prize:**

Yanique Bedward  
Michael Jharma  
Nathan Bursary

**Delano Thomas - Level II  
Departmental Prize:**

Natalie McLean – Dean's List  
Tricia Evans – Dean's List  
Francois Brown – Francis Bowen  
Bursary