

REPORT

5th AFRICAN LASER CENTRE STUDENT WORKSHOP



14 - 18 November 2012, Hotel Safari, Windhoek, Namibia

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GENERAL

The 5th ALC Student Workshop was hosted in Windhoek Namibia this year. The Conference venue, as well as the accommodation of the workshop was in the Hotel Safari. (Picture below). This year the Workshop was mainly sponsored by African Laser Centre and the Department of Education of the Namibian Government. The Organising committee for this year's event is listed in the following table.

ORGANISING COMMITTEE

Workshop Chair	Prof Erich Rohwer
Workshop Secretariat	Prof Piet Walters
ALC /NLC Liaison	Dr Paul Motalane
Review Committee chair	Prof Hubertus von Bergmann
Programme Committee Chair	Prof Heinrich Schwoerer
US Liaison	Dr Pieter Neethling
US Liaison	Dr Christine Steenkamp
NMMU Liaison	Prof Andrew Leitch
UFS Liaison	Prof M Ntwaeaborwa
UNAM Liaison	Prof S Singh

The workshop secretariat, Piet Walters, Laser Research Institute, Physics, University of Stellenbosch was responsible for the academic part of the workshop, putting the program together, organizing the delegate packs, program manual, air tickets, certificates, invited speakers for plenary lectures and speakers for the tutorial lectures. Prof Singh from Physics, UNAM was responsible for the local arrangements in Windhoek, i.e. accommodation, venue, transport and excursion.



The closed setup on the hotel did indeed encourage interaction between grant holders and students. We were privileged to have the Peer Review Committee visiting us and have their meetings scheduled to also attend the student presentations. The ALC Board also took the opportunity to have their board meeting and be part of the proceedings.

The format of the Workshop proceedings was the same as last year, adding an extra day to include 8 tutorial sessions. Delegates arrived by transport provided by UNAM on Wednesday 14th November. On Thursday and Friday morning report back oral and poster presentations took place. Friday afternoon and Saturday morning was devoted to 8 tutorial lectures in laser physics on topics which were selected to interest and stimulate the minds of the students.

The Workshop was attended by 60 people (pictured below), which included the delegates, Peer Review Committee and the ALC board. The delegates came from 19 countries and presented 17 institutions, as shown by the list of delegates at the end of the report.



All the attendees to the 5th annual ALC Student Workshop.

The Abstract Review & Scientific Advisory Committee was appointed and selected contributors after considering the abstracts presented with the applications of the students. The selection was divided into two categories: Oral contributions and poster contributions.

Abstract Review & Scientific Advisory Committee

Prof Hubertus von Bergmann, US

Prof Erich Rohwer, US

Prof Heinrich Schwoerer, US

Prof Hendrik Swart, UFS

Prof Andrew Forbes, NLC

Dr Lourens Botha, NLC

A programme committee was appointed and the scientific programme was put together by the committee. The final programme is attached as an attachment at the back of this report

Programme Committee

Prof Heinrich Schwoerer, US

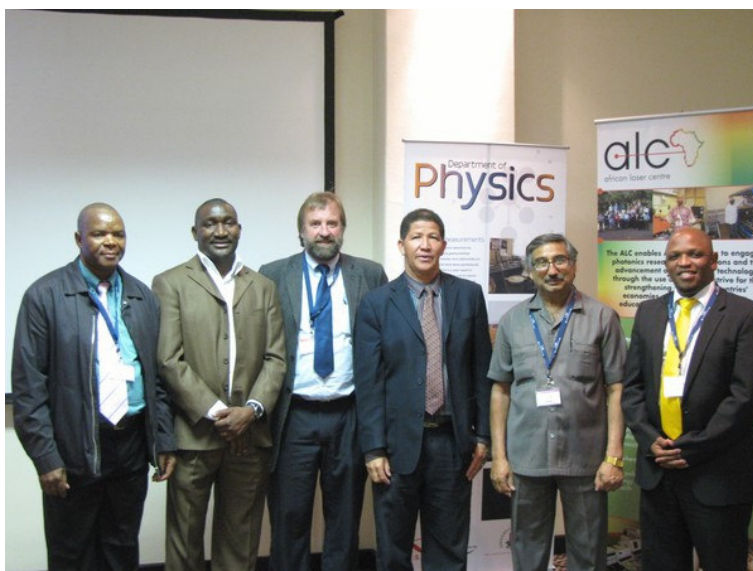
Prof Ernest van Dyk, NMMU

Prof Andrew Leitch, NMMU

Prof Erich Rohwer, US

Prof Andrew Forbes, NLC

The Workshop's Opening proceedings took place in the Auditorium and the opening dinner in the Safari Court Hotel on Wednesday evening 14 November. After a hearty welcome by Prof Erich Rohwer, Chairman of the organising committee and master of ceremonies, we were honoured by words of welcome by Dr N. Cingo, Chairman ALC Board, followed by introductory remarks by Dr R Steenkamp, head of the department of physics, UNAM. Then words of welcome by Dr F Gideon, Dean faculty of Science. The opening address was presented by Mr Alfred van Kent, Director of Science and Technology, Department of Education, Government of Namibia. The opening dinner was hosted in the Safari Court Hotel.



Dr P Motalane, Dr F Gideon, Prof E Rohwer, Mr A van Kent, Prof S Singh, Dr N Cingo at the opening proceedings of the Workshop.

The workshop proceedings started on Thursday morning in the Auditorium of the Hotel Safari. In total we had 19 oral presentations in five sessions over a period of a day and a half. Additionally we had 7 poster presentations from ALC delegates on Thursday afternoon. Due to difficulties to obtain visas for Namibia 3 delegates could not attend. Two posters were withdrawn. The one oral by Hassan Seed Ahmed was presented by Prof Martin Ntwaeaborwa, UFS.

We had the honour of having 3 invited speakers for the student workshop.



1. Prof Thomas Feurer, full professor in Physics at the University of Bern, Switzerland. The title of his talk was “Coherent THz spectroscopy and imaging”. He reviewed their activities in THz imaging, specifically in THz near-field imaging. They applied these techniques to various systems, such as 3D image reconstruction, chemical imaging, THz photonic crystals, or THz meta-materials. Further they demonstrated that plasmonic nano-structures in thin metal sheets are promising tools for THz switching or nonlinear THz science. If designed appropriately, such structures show extremely strong field enhancements.



2. Dr Alexander Heidt is a research fellow in Mid-Infrared Photonics at the Optoelectronics Research Centre, University of Southampton, UK. The title of his talk was “A special kind of white light”. He discussed the spectacular phenomenon in nonlinear fiber optics, namely the extreme spectral broadening observed in the process of supercontinuum (SC) generation. He explored some of the fascinating properties and applications of this special kind of white light. The talk included the most famous example, the generation of frequency combs that revolutionized metrology. He discussed current efforts to extend SC generation towards mid-IR wavelengths, with many new potential applications in precision spectroscopy, telecommunications and bio-photonics.



3. Prof Mourad Zghal, Engineering School of communications of Tunis, Université of Carthage, El Ghazala Ariana Tunisia. The title of his talk was “Photonic Crystal Fibres: Fundamentals and applications.” The talk reviewed the physics behind the process of supercontinuum generation in photonic crystal fibres, as well as applications ranging from sensors to lasers and to different types of passive and active waveguide devices.

The Chairman appointed a panel of referees to judge student presenters according to the science quality and presentation quality of their presentation. The members of the panel were

Presentation Referee Panel

- Prof Hubertus von Bergmann, US
- Prof Hendrik Swart, UFS
- Dr Lourens Botha, NLC
- Prof Andrew Leitch, NMMU
- Prof Thomas Feurer
- Dr Alexander Heidt
- Prof Heinrich Schwoerer

Our sincere thanks go to Wirsam Scientific who sponsored our awards. Five awards for exceptional presentations at the Workshop 2011 were personally handed over by Dr Ndumiso Cingo at the conclusion of the workshop proceedings. Prizes were awarded to the following students:

NAME	CATEGORY	INSTITUTION	TITLE
Stephen Nyoni	PhD Oral	Dept of Chemistry, Rhodes University	Non-invasive mediators of photothermal cancer ablation.
Jonah Kuria	PhD Poster	Dept of Physics, WITS	Growth and Characterization of RF Magnetron Sputtered NbN and ZrN thin films.
Daniel Glaser Rachana Bedekar	MSc Oral	School of Mechanical, Aeronautical and Industrial Eng., WITS	Laser shock peening for fatigue life enhancement of aluminium alloy airframe structures.
Sandra Ayuk	MSc Poster	Laser Research Centre, Faculty of Health Sciences, UJ	Low Intensity Laser Irradiation Stimulates Collagen Production in Diabetic Wounded Fibroblast Cells.



Rachana Bedekar – MSc oral



Daniel Glaser – MSc oral



Stephen Nyoni – PhD oral



Sandra Ayuk – MSc poster



Jonah Kuria- PhD poster

At the conclusion of the workshop proceedings a certificate stating that the recipient made a presentation at the 5th ALC Student Workshop 2012 were handed out to all the presenters by Mr Alfred van Kent. Photos of the presenters receiving certificates are placed on the official website of the workshop.

The 2012 Workshop was extended to include a full day of Special Tutorial topics by selected speakers in an effort to stimulate the interest of the students. These two sessions included 8 talks as listed below:

	Title	Speaker
1	Charge density wave dynamics in transition-metal dichalcogenides, probed with femtosecond electron diffraction.	Prof Heinrich Schwoerer
2	Select aspects of Levitron magnetic trapping and its relevance to laser trapping.	Prof Max Michaelis
3	Molecular beam epitaxy: From quantum wells to quantum dots: From research to mass production.	Prof Mohamed Henini
4	THz generation, manipulation, and detection.	Prof Thomas Feurer
5	Quantum coherent control using ultrafast lasers.	Dr Lourens Botha
6	Light Beam Induced Current measurements for the characterization of Photovoltaic devices.	Prof Ernest van Dyk
7	Controlling Nonlinear Optics in Specialty Fibers.	Dr Alex Heidt
8	Basics of optical fibre communication.	Prof Mourad Zghal

At the end of the special topic sessions before lunch on Saturday, the proceedings of the 2011 Workshop was concluded by a word of special thanks by Dr Ndumiso Cingo.

A milestone was reached when the students attending the workshop decided to form an OSA Student Chapter under the leadership of Sandra Ayuk, Laser Research Centre, Faculty of Health Sciences, University of Johannesburg. There are important advantages and opportunities created by such an OSA student chapter. The fact that funding is made possible by OSA to buy demonstration equipment to promote optics and lasers to schools, to attend overseas conferences and the opportunity to invite internationally acclaimed scientists.

Every delegate received an ALC zipper folder, as well as an ALC embroidered golf shirt and cap at registration.

On Saturday afternoon the delegates were taken on an excursion to Ukapuka Game Farm.

CONCLUDING REMARKS

We would like to thank the ALC and the Namibian Government for their generous support to host this prestigious event. We got a positive feedback about the workshop. Delegates were happy about the venue, the professional service they experienced, the unique opportunity to have this interaction with fellow students as well as invited speakers and other project leaders.

Several senior delegates mentioned that the quality of the scientific work produced and level of performance of the students in the laser research field improved over the last number of years.

DELEGATES TO THE WORKSHOP

Surname	Initials	First name	Title	Institution	Nationality
Ali	A G	Abdub	Mr	University of the Free State	Kenya
Ayuk	S M	Sandra	Ms	UJ	Cameroon
Baricholo	P	Peter	Dr	National University of Science and Technology, Bulawayo	Zimbabwe
Bedekar	R D	Rachana	Ms	WITS	India
Chabata	T V	Tichakunda Valentine	Mr	NMMU	Zimbabwe
Davhana	M I	Musiiwa	Mr	Tshwane Univ of Technology	RSA
Dejene	F B	Francis	Prof	University of the Free State	Kenya
Glaser	D	Daniel	Mr	WITS	RSA
Ireeta	W T	Winston	Dr	Makerere University	Uganda
Kebede	M A	Melkamu	Mr	University of the Free State	Ethiopia
Khamlich	S	Saleh	Mr	iThemba LABS	Morocco
Kuria	JM	Jonah	Mr	WITS	Kenya
Kwarikunda	N K	Nicholas	Mr	NMMU	Uganda
Kyeyune	F B	Farooq	Mr	US	Uganda
Leitch	A W R	Andrew	Prof	NMMU	RSA
Mahamood	RM	Rasheedat	Ms	UJ	Nigeria
Mathevula	L E	Langutani	Ms	iThemba LABS	RSA
Mukarugina	S	Stephanie	Ms	UJ	DRC Congo
Ndebeka	W I	Wilfrid	Mr	US	Rep of Congo
Venadiambu Nimwa	P	Patrick	Mr	UJ	DRC Congo
Ntwaeaborwa	O M	Martin	Prof	University of the Free State	RSA
Nyoni	S	Stephen	Mr	Rhodes University	Zimbabwe
Okullo	W	Willy	Dr	Makerere University	Uganda
Okoye	R	Raphael	Mr	US	Nigeria
Olakanmi	E O	Eyitayo	Dr	UJ	Nigeria
Polese	C	Claudia	Prof	WITS	Italy
Rehman	S	Saif-ur	Mr	Moroccan Foundation for Science, Innovation & Research (MAScIR)	Pakistan
Sanusi	S O	Sikiru	Mr	Rhodes University	Nigeria
Sechogela	T P	Thulaganyo Phillip	Mr	iThemba LABS	RSA
Senekane	M C	Makhamisa	Mr	UKZN	Lesotho
Swart	H C	Hendrik	Prof	University of the Free State	RSA
Tshabalala	L C	Lerato	Mrs	Tshwane Univ of Technology	RSA
Van Dyk	E E	Ernest	Prof	NMMU	RSA
Vorster	F J	Frederik	Dr	NMMU	RSA
Yalisi	B	Brian	Mr	CSIR	Zimbabwe

Zongo	S	Sidiki	Mr	iThemba LABS	Burkina Faso
Botha	L	Lourens	Dr	CSIR	RSA
Neethling	P H	Pieter	Dr	Univ of Stellenbosch	RSA
Rohwer	E G	Erich	Prof	Univ of Stellenbosch	RSA
Schwoerer	H E	Heinrich	Prof	Univ of Stellenbosch	Germany
Walters	P E	Pieter	Prof	Univ of Stellenbosch	RSA
Zghal	M	Mourad	Prof	Engineering School of communications of Tunis, Université of Carthage	Tunisia
Heidt	A	Alex	Dr	Optoelectronics Research Centre	Germany
Feurer	T	Thomas	Prof	Inst. For Applied Physics	Germany

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PEER REVIEW COMMITTEE

Mtingwa	S	Sekazi	Prof	CSIR, NLC, Pretoria	
Evans-Lutterodt	K	Kenneth	Dr	Brookhaven National Laboratory, Upton, NY, USA	
du Plooy	T	Thomas	Mr	CSIR, NLC, Pretoria	
Henini	M	Mohamed	Prof	School of Physics and Astronomy, University of Nottingham, UK	
Michaelis	M	Max	Prof	School of Physics, University of KwaZulu-Natal, Durban	
Motalane	P	Paul	Dr	CSIR, NLC, Pretoria	
Msezane	A	Alfred	Prof	CTSPS, Clark Atlanta University, Atlanta, USA	
Von Bergmann	H	Hubertus	Prof	Univ. of Stellenbosch	

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ALC BOARD MEMBERS

Amara	EH	El Hachemi	Dr	CDTA, Baba-Hassen, Algiers, Algeria	
Asante	J	Joseph	Dr	Tswane University of Technology, Pretoria	
Cingo	N	Ndumiso	Dr	CSIR, NLC, Pretoria	
Erasmus	RM	Rudolph	Dr	School of Physics, WITS, Johannesburg	
Kioni	P N	Paul	Prof	Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya	
Ndjaka	J-M		Dr	Cameroon	
Motalane	P	Paul	Dr	CSIR, NLC, Pretoria	
Mtingwa	S	Sekazi	Prof	Senior Physicist Consultant, Brookhaven National Laboratory, Upton, NY, USA	
Sekota	M	Mantoa	Dr	Faculty of Science and Technology, National University of Lesotho	
Singh	S	Shyam	Prof	University of Namibia, Windhoek, Namibia	
Otiti	T	Tom	Prof	Physics Department, Faculty of Science, Makerere University, Kampala	
Von Bergmann	HM	Hubertus	Prof	LRI, Physics, Univ of Stellenbosch	

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TOTAL

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COUNTRIES REPRESENTED BY THE DELEGATES

Kenya	3
Cameroon	1
Zimbabwe	4
India	1
Zimbabwe	2
RSA	14
Uganda	4
Ethiopia	1
Morocco	1
Nigeria	4
DRC Congo	2
Rep of Congo	1
Italy	1
Pakistan	1
Lesotho	1
Burkina Faso	1
Germany	1
Tunisia	1
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PROGRAM: ALC STUDENT WORKSHOP 2012
14-18 November 2012

Wednesday, 14 November

10:00 – 18:00	Arrive at Venue
18:00 – 19:00	Registration
19:00 – 20:00	Opening Proceedings - Chairman: Prof E G Rohwer
	<ul style="list-style-type: none"> - Introduction by Prof Shyam Singh - Introductory remarks by Dr R Steenkamp, Head, Physics, UNAM - Welcoming by Dr F Gideon, Dean, Faculty of Science, UNAM - Address by Dr N. Cingo, Chairman ALC Board - Address by Mr. Alfred van Kent, Director of Science and Technology, Ministry of Education
20:00	Dinner

Thursday, 15 November

07:00 – 08:00 Breakfast

Session 1 Chair: Erich Rohwer

			Abstract
08:00 – 09:00	Coherent THz spectroscopy and imaging.	Prof Thomas Feurer	INV 01
09:00 – 09:20	Insight into PMD Regimes: An Analysis on Buried Optical Fibres.	<u>W.T. Ireeta</u> , V. Musara, L. Wu, and A.W.R. Leitch	T1
09:20 – 09:40	Integrating spectral measurements into solar light beam induced current (S-LBIC) measurements.	<u>N. Kwarikunda</u> , E.E. van Dyk, F.J. Vorster, W. Okullo and M.K. Munji	T2
09:40 – 10:00	Thickness dependence of pulsed laser deposited MWCNT/NiO selective solar absorbers.	<u>B. Yalisi</u> , A, Forbes and Kittessa Roro	T3
10:00 – 10:20	Laser shock peening for	<u>D. Glaser</u> , <u>R.D. Bedekar</u> ,	T4

fatigue life enhancement of aluminium alloy airframe structures.

C. Polese and B. Masina

10:20 – 10:40 Tea

Session 2 *Chair: Andrew Leitch*

			Abstract
10:40 – 11:40	A special kind of white light.	Dr Alex Heidt	INV 02
11:40 – 12:00	Experimental studies on spectral broadening and polarisation state of white light generated in a laterally stressed photonic crystal fibre.	<u>P. Baricholo</u> , W. Ndebeka, P.H. Neethling, A. Heidt and E. Rohwer	T5
12:00 – 12:20	Electric field induced second harmonic measurements on Si/SiO ₂ interface from silicon membranes.	<u>W.I. Ndebeka</u> , P.H. Neethling, C.M. Steenkamp, H. Stafast and E.G. Rohwer	T6
12:20 – 12:40	Prism Pulse Compressor.	<u>R.Okoye</u> E.G Rohwer, P.H. Neethling	T7
12:40 – 13:00	An efficient all-solid-state switched exciter for pumping a TEA CO ₂ laser.	<u>F. Kyeyune</u> , H.M. von Bergmann and E.G. Rohwer	T8
13:00 – 14:00	Lunch		

Session 3 *Chair: Ernest van Dyk*

			Abstract
14:00 – 14:20	Photo-induced Electron Spin Resonance (ESR) phenomena in a-Cr ₂ O ₃ mono-dispersed spherical particles.	<u>S. Khamlich</u> , V.V. Srinivasu, A. Konkin, R. McCrindle, N. Cingo and M. Maaza	T9
14:20 – 14:40	Pulsed laser deposition of VO ₂ based smart IR coatings for heat management in CubeSat space applications.	<u>L. Mathevula</u> , B.D Ngom, C Kotsedi, P.Sechogela, V.V Srinivasu, M.Maaza	T10
14:40 – 15:00	Novel tunable transparent conductive oxides by pulsed	<u>T.P. Sechogela</u> , M. Nkosi, G. Hardie, R. Bucher, R.	T11

	laser ablation.	Madjoe, M. Maaza	
15:00 – 15:20	Nonlinear optical properties of selected natural dyes investigated in the femtosecond regime.	<u>S. Zongo</u> , L. Kotsedi, P. Mthunzi, S.Khamlish, S.Y. Alqaradawi, M. Maaza	T12
15:20 – 16:00	Poster Introduction		
16:00 – 18:00	Tea & Poster Session	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11	
18:00 – 19:30	ALC Board Meeting		
19:30 – 20:30	Dinner		
20:30 – 22:30	ALC Annual General Meeting		

Friday, 16 November

07:00 – 08:00 Breakfast

Session 4 Chair: Heinrich Schwoerer

			Abstract
08:00 – 09:00	Photonic Crystal Fibres: Fundamentals and applications.	Prof Mourad Zghal	INV 03
09:00 – 09:20	Non-invasive mediators of photothermal cancer ablation.	<u>S. Nyoni</u> and T. Nyokong	T13
09:20 – 09:40	The use of lasers for the development of phthalocyanines and derivatives for nonlinear optical applications.	<u>S. O. Sanusi</u> , J. Mack and T. Nyokong	T14
09:40 – 10:00	Influence of annealing temperature on $Y_3(Al,Ga)_5O_{12}:Tb$ thin films grown by PLD.	<u>A. Yousif Mohammed</u> , H.C. Swart, O.M. Ntwaeaborwa and E. Coetsee	T15
10:00 – 10:20	Densification kinetics of selective laser melted (SLM) pure and pre-alloyed aluminium powders.	<u>E. O. Olakanmi</u> , R.F. Cochrane, K. W. Dalgarno and M. Doyoyo	T16

10:20 – 10:40 Tea

Session 5 **Chair: Hendrik Swart**

Abstract

10:40 – 11:40	Charge density wave dynamics in transition-metal dichalcogenides, probed with femtosecond electron diffraction.	Prof Heinrich Schwoerer	ST1
11:40 – 12:00	Prototype development of fibre Bragg grating based vibration sensor.	<u>S. Mukarugina</u> and R. Martinez	T17
12:00 – 12:20	Design and experimental development of an actively mode-locked fibre ring laser.	<u>P. V. Nimwa</u> , R. Martinez Manuel and J J M Kaboko	T18
12:20 – 12:40	Plasmionics at metallic thin layers.	<u>S. Rehman</u> , A.Rahmouni, T. Mahfoud, D. Nesterenko, K. Nouneh, and Z. Sekkat	T19
12:40 – 13:00	Conclusion of Reports and Certificates		

13:00 – 14:00 Lunch

Session 7 **Chair: Erich Rohwer**

Nitrogen Laser Construction

		Abstract	
14:00 – 15:00	Select aspects of Levitron magnetic trapping and its relevance to laser trapping.	ST2 Prof Max Michaelis	Lab W116 Physics Department
15:00 – 16:00	Molecular beam epitaxy: From quantum wells to quantum dots: From research to mass production.	ST3 Prof Mohamed Henini	

			Abstract
16:00 – 16:20	Tea		
16:20 – 17:20	THz generation, manipulation, and detection.	Prof Thomas Feurer	ST4
19:30 – 22:00	Dinner		
20:30 – 22:30	ALC General Members Meeting		

Saturday, 17 November

07:00 – 08:00 Breakfast

Session 8 Chair: Erich Rohwer

			Abstract
08:00 – 09:00	Quantum coherent control using ultrafast lasers.	Dr Lourens Botha	ST5
09:00 – 10:00	Light Beam Induced Current measurements for the characterization of Photovoltaic devices.	Prof Ernest van Dyk	ST6
10:00– 10:30	Tea		
10:30 – 11:30	Controlling Nonlinear Optics in Specialty Fibers.	Dr Alex Heidt	ST7
11:30 – 12:30	Basics of optical fibre communication.	Prof Mourad Zghal	ST8
12:30 -12:40	Conclusion and Awards Ceremony		
12:40 – 19:00	Lunch & Excursion to Okapuka Game Ranch		
19:30 – 21:00	Dinner		

Sunday, 18 November

07:00 – 08:00 Breakfast

08:30 – 12:00 Departure for Airport