

Dr. Duncan Kiboi Boiyo, PhD

Name: Dr. Duncan Kiboi Boiyo

Sex: Male

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Languages spoken and Ability: English, Swahili and Sabaot

Education Background

- Postdoctoral Studies (Physics) -Feb 2017- to date
Nelson Mandela Metropolitan University, Port Elizabeth, South Africa
- PhD in Physics (Optical Fiber Telecommunication Systems)- 2017
Nelson Mandela Metropolitan University, Port Elizabeth, South Africa
- MSc in Physics (Laser Optics)-2013
University of Eldoret, Eldoret, Kenya
- BSc (Physics and Mathematics)- 2009
Moi University, Eldoret, Kenya
- KCSE- 2003
Lenana School, Nairobi
- KCPE-1999
Namorio Primary School, Mt. Elgon

Professional Certifications

- Certificate in Laser Applications and Safety -2014
Council of Scientific and Industrial Research (CSIR), South Africa

Papers Published in Peer-Refereed Journals

1. **D. Kiboi Boiyo**, E.K. Rotich Kipnoo, R.R.G. Gamatham, A.W.R. Leitch, T.B. Gibbon, A Signal Impairment-Aware Scheme for Next-Gen Flexible Spectrum in 10 Gb/s VCSEL Metro-Access Optical Fibre Networks, *Optical Switching and Networking*, Volume 25, 18 March 2017, Pages 57-62, ISSN **1573-4277**.



2. E.K. Rotich Kipnoo, **D. Kiboi Boiyo**, G.M. Isoe, T.V. Chabata, R.R.G. Gamatham, A.W.R. Leitch, T.B. Gibbon, Demonstration of Raman-based, dispersion-managed VCSEL technology for fibre-to-the-hut application, *Optical Fiber Technology*, Volume 34, March 2017, Pages 1-5, ISSN **1068-5200**,
3. **Duncan Kiboi Boiyo**, T.V. Chabata, E.K. Rotich Kipnoo, R.R.G. Gamatham, A.W.R. Leitch, T.B. Gibbon, Reconfigurable high-speed optical fibre networks: Optical wavelength conversion and switching using VCSELs to eliminate channel collisions, *Optical Fiber Technology*, Volume 33, January 2017, Pages 30-35, ISSN **1068-5200**.
4. T. V. Chabata, **D. Kiboi Boiyo**, E. K. R. Kipnoo, R. R. G. Gamatham, A. W. R. Leitch, and T. B. Gibbon, Signal monitoring and performance stability evaluation tool in a high speed optical communication network, *Opt. - Int. J. Light Electron Opt.*, vol. 127, no. 20, pp. 9001–9007, 2016. ISSN: **0030-4026**.

Conference and Workshop Presentations and their Proceedings

1. **D. Kiboi Boiyo** and Tim Gibbon, “Flexible Spectrum for High Speed Optical Fibre Networks”, SKA SA-HCD 2016 Postgraduate Bursary Conference, *Fire and Ice Hotel, Cape Town*, 28th Nov-2nd Dec 2016).
2. **D. Kiboi Boiyo**, Tim Gibbon and Andrew Leitch, “An all optical VCSEL-to-VCSEL 1550 nm wavelength conversion for high-speed fibre transmission”, **9th African Laser Centre Student Workshop STIAS, Stellenbosch**, South Africa (23rd- 28th Nov 2016).
3. **D. Kiboi Boiyo**, G. M. Isoe, A.W.R. Leitch, R.R.G. Gamatham, T.B. Gibbon, "A 1550 nm All Optical VCSEL to VCSEL Wavelength Conversion of a 8.5 Gb/s Data Signal and Transmission over a 24.7 km Fibre", **Proc. SPIE**, Skukuza, South Africa (11-15th Sept 2016), **vol. 10036. SPIE, p. 100360X-1-100360X-6, 2017**.
4. **D. Kiboi Boiyo**, G. M. Isoe, E. K. Rotich Kipnoo, R. R. G. Gamatham, A.W. R. Leitch and T. B. Gibbon, “Utilization of Flexible Spectrum to Optimize a 24.7 km Fibre TDM Passive Optical Network”, Proceedings of the SATNAC Conference 2016, Fancourt, George, South Africa (4th – 7th Sept 2016), p.p. 8-12. ISBN: **978-0-620-72418-0**.
5. G. M. Isoe, **D. Kiboi Boiyo**, S. Wassin, E. K. Rotich Kipnoo, R. R. G. Gamatham, A.W. R. Leitch and T. B. Gibbon, “Effect of 10 Gbps Data Transmission on 1.712 GHz 1309.97 nm VCSEL Based Radio Frequency Distribution over a Single Optical Fibre for the Telescope Array”, Proceedings of the SATNAC Conference 2016, Fancourt, George, South Africa (4th – 7th Sept 2016), p.p. 156-159. ISBN: **978-0-620-72418-0**.
6. Shukree Wassin, George M. Isoe, **D. Kiboi Boiyo**, Romeo R. G. Gamatham, Andrew W. R. Leitch and Tim B. Gibbon, “Component Power Budget Analysis and VCSEL Characterization for the Square Kilometre Array Signal and Data Transport Network”, Proceedings of the SATNAC Conference 2016, Fancourt, George, South Africa (4th – 7th Sept 2016), p.p. 160-164. ISBN: **978-0-620-72418-0**.
7. K.J. Leburu, G.M. Isoe, S. Wassin, **D. Kiboi Boiyo**, R.R.G. Gamatham, A.W.R. Leitch and T. B. Gibbon, “Transmission of Pulse per Second Clock Tone Signals in Optical Communication Systems over Optical Fibre and Free Space” Proceedings of the SATNAC Conference 2016, Fancourt, George, South Africa (4th – 7th Sept 2016), p.p. 21-24. ISBN: **978-0-620-72418-0**.

8. **D. Kiboi Boiyo**, G. M. Isoe, E. K. Rotich Kipnoo, R. R. G. Gamatham, A.W. R. Leitch and T. B. Gibbon, "Characterization and Compensation of Fibre Link Dispersion in a 10 Gb/s Flexible Network", 61st SAIP Conference 2016, 4-8th July 2016, Kramer Law building, University of Cape Town, Cape Town, South Africa-Poster.
9. G. M. Isoe, **D. Kiboi Boiyo**, S. Wassin, P. P. Dlamini, E. K. Rotich Kipnoo, R. R. G. Gamatham, A.W. R. Leitch and T. B. Gibbon, "Effect of 1.712 GHz RF-Clock Signal Distribution on 10 Gbps 1550.89 nm VCSEL Based Transmission over Single Optical Fibre for Square Kilometre Telescope Array", Proceedings of 61st SAIP Conference 2016, 4-8th July 2016, Kramer Law building, University of Cape Town, Cape Town, South Africa.
10. S. Wassin, G. M. Isoe, **D. Kiboi Boiyo**, E. K. Kipnoo Rotich, R. R. G. Gamatham, A.W.R Leitch and T. B. Gibbon, "Power Budget Analysis of Passive Components along an Optical Fibre Link of a Frequency Dissemination System within the MeerKAT Telescope Array", Proceedings of 61st SAIP Conference 2016, 4-8th July 2016, Kramer Law building, University of Cape Town, Cape Town, South Africa.
11. K.J. Leburu, **D. Kiboi Boiyo**, G.M. Isoe, S. Wassin, R.R.G. Gamatham, A.W.R. Leitch and T. B. Gibbon, "Advantages of Free Space Optics over Optical Fibre for Clock Tone Distribution in a 2.5 GHz Transmission Link", Proceedings of 61st SAIP Conference 2016, 4-8th July 2016, Kramer Law building, University of Cape Town, Cape Town, South Africa-Poster.
12. P.P. Dlamini, **D. Kiboi Boiyo**, T. B. Gibbon, R.R.G. Gamatham, A.W.R. Leitch, "Laser Effect on the RF Signal Stability for Clock Signal Distribution over Optical Fibre", Proceedings of 61st SAIP Conference 2016, 4-8th July 2016, Kramer Law building, University of Cape Town, Cape Town, South Africa.
13. **D. Kiboi Boiyo**, G. M. Isoe, S. Wassin, E. K. Rotich Kipnoo, R. R. G. Gamatham, A.W. R. Leitch and T. B. Gibbon, "An all Optical VCSEL Wavelength Conversion for Optical Fibre Access Networks", Proceedings of the 2016 Annual Conference on Sustainable Research and Innovation, 4-6th May 2016, JKUAT, Nairobi-Kenya, p.p. 17-20. ISSN: **2079-6226**.
14. S. Wassin, G. M. Isoe, **D. Kiboi Boiyo**, E. K. Kipnoo Rotich, R. R. G. Gamatham, A. W. R Leitch and T. B. Gibbon, "The Square Kilometre Array: The Notion of Timing and Synchronization", Proceedings of the 2016 Annual Conference on Sustainable Research and Innovation, 4-6th May 2016, JKUAT, Nairobi- Kenya, p.p. 52-55. ISSN: **2079-6226**.
15. I. M. Matere, D.W. Waswa, J. Tonui, **D. Kiboi Boiyo**, "Modeling of ring resonators as optical Filters using MEEP", Proceedings of the 2016 Annual Conference on Sustainable Research and Innovation, 4-6th May 2016, JKUAT, Nairobi- Kenya, p.p. 114-118. ISSN: **2079-6226**.
16. **D. Kiboi Boiyo** and Tim Gibbon, "Advanced Modulation Techniques in a 80 Gb/S Flexible Spectrum for SKA High Speed Data Transport", SKA SA-HCD 2015 Postgraduate Bursary Conference, Stellenbosch, Cape Town, 30th Nov-8th Dec 2015).
17. **D. Kiboi Boiyo**, Tim Gibbon and Andrew Leitch, "Reconfigurable Optical Networks for Next Generation Optical Fibre Transmission", 8th African Laser Centre Student Workshop Zevenwacht, Stellenbosch, South Africa (2nd- 4th Dec 2015).
18. **D. Kiboi Boiyo**, T.V. Chabata, E.K. Rotich Kipnoo, R.R.G. Gamatham, A.W.R. Leitch and T.B. Gibbon, "Crosstalk Penalties in Optical Fibre Transport for Next-Generation Flexible Spectrum Networks", Proceedings of the SATNAC Conference 2015, Arabella, Hermanus, Western Cape, South Africa (6th – 9th Sept 2015), p.p. 21-24. ISBN: 978-0-620-67151-4.

19. T.V. Chabata, **D. Kiboi Boiyo**, E.K. Rotich Kipnoo, R.R.G. Gamatham, A.W.R. Leitch and T.B. Gibbon, "Directly Modulated 10.3 Gb/s Coherent Detection Scheme for Passive Optical Access Network in the Fibre-to-the-Hut Technology", Proceedings of the SATNAC Conference 2015, Arabella, Hermanus, Western Cape, South Africa (6-9th Sept 2015), p.p. 37-40. ISBN: **978-0-620-67151-4**.
20. **D. Kiboi Boiyo**, T.V. Chabata, Romeo Gamatham, A.W.R. Leitch and T.B. Gibbon, "Reconfigurable Wavelength Selective Switching for 10 Gbps Optical Fibre Ring Networks", 60th SAIP Conference 2015, Boardwalk, Port Elizabeth, South Africa (29th June – 3rd July 2015).
21. T.V. Chabata, **D. Kiboi Boiyo**, E.K. Rotich Kipnoo, R.R.G. Gamatham, A.W.R. Leitch and T.B. Gibbon, "Performance Comparison between the Traditional Intensity Modulation Direct Detection and Coherent Detection in a High Speed Optical Fibre Communication System", Proceedings of the 60th SAIP Conference 2015, Boardwalk, Port Elizabeth, South Africa (29th June – 3rd July 2015). ISSN: **978-0-620-70714-5**.
22. G.M Isoe, E.K Rotich, **D.K Boiyo**, R.R.G. Gamatham, A.W.R Leitch, T.B. Gibbon, K.M. Muguro and D.W. Waswa, "Noise figure and pump reflection power in SMF-reach optical fibre for Raman amplification," in IEEE AFRICON, 2015, Addis Ababa, Ethiopia, vol., no., pp.1-5, 14-17th Sept.2015.
23. **D Kiboi Boiyo**, EK Kipnoo, R Gamatham, AWR Leitch, TB Gibbon, "Effects of Crosstalk on a 20 Gb/s Flexible Grid 12 km Optical Fibre Transmission", SKA SA-HCD 2014 Postgraduate Bursary Conference, Stellenbosch, Cape Town, South Africa, 4-8th Dec 2014.
24. **D Kiboi Boiyo**, EK Kipnoo, R Gamatham, AWR Leitch, TB Gibbon "Evaluation of Efficient Guard Bands on Flexible Grids in an Optical Fibre Transmission", Proceedings of the ALC Annual Workshop 2014, p.p. 30, Rabat, Morocco (3-5 November 2014).
25. **D Kiboi Boiyo**, EK Rotich Kipnoo, RRG Gamatham, AWR. Leitch, TB Gibbon, "Towards Investigating Transmission Penalties in a Flexible Spectrum Optical Network". Proceedings of the SATNAC Conference 2014, the Boardwalk, Port Elizabeth, Eastern Cape, South Africa, (31st Aug – 3 Sept 2014), p.p. 459-460. (WIP Paper). ISBN: **978-0-620-61965-3**.
26. **D Kiboi Boiyo**, EK Rotich Kipnoo, AWR Leitch, TB Gibbon, "Flexible Spectrum and the Effects of Crosstalk on a 20 Gbps Signal over 12 km Optical Fibre". Proceedings of the 59th SAIP Conference 2014, Johannesburg, South Africa (7 – 11 July 2014).
27. G. M. Isoe, K. M. Muguro, D. W. Waswa, D. Osiemo, E. Kirui, H. Cherutoi, **D. K. Boiyo**, E. Rotich Kipnoo, "Forward Raman Amplification Characterization in Optical Networks", Proceedings of 2014 International Conference on Sustainable Research and Innovation, Volume 5, 7th-9th May 2014. ISSN **2079-6226**.
28. **D. Kiboi Boiyo**, S.Kuja, D.Waswa, G. Amolo, R. R. G. Gamatham, E. K. Rotich Kipnoo, T. B. Gibbon and A. W.R. Leitch, "Effects of Polarization Mode Dispersion (PMD) on Raman Gain and PMD Measurement using an Optical Fibre Raman Amplifier", 2013 *Africon*, Pointe-Aux-Piments, 2013, pp. 1-5. doi: 10.1109/AFRCON.2013.6757592.
29. S. Kuja, **D. Boiyo**, D. Waswa, G. Amolo, E. Kipnoo, T. Gibbon, and A. Leitch, "Comparison of PMF and LEAF as Optical Fibre Stress and Temperature Sensing Elements," in *Advanced Photonics 2013*, H. Chang, V. Tolstikhin, T. Krauss, and M. Watts, eds., OSA Technical Digest (online) (Optical Society of America, 2013), paper JT3A.32.

30. **D. Kiboi Boiyo**, S. Kuja, D. Waswa, K. M. Muguro, G. Amolo, “Modelling of an optical Raman amplifier”, Proceedings of the 2012 Mechanical Engineering Conference on Sustainable Research and Innovation, Volume 4, 3rd-4th May 2012. ISSN **2079-6226**.

Membership scientific societies

- a) South African Institute of Physics (SAIP)
- b) African Laser Centre (ALC) Student Chapter
- c) Optical Society of America (OSA)
- d) Society of Photo-Optical Instrumentation Engineers (SPIE)

Journal Reviews

1. *Journals in Elsevier*

Research Grants and Scholarships

1. 2014- 2016: Awarded the African Laser Centre (ALC), PhD Scholarship for studies at Nelson Mandela Metropolitan University, South Africa.
2. 2014-2016: Awarded the Square Kilometre Array (SKA), South Africa PhD Scholarship for studies at Nelson Mandela Metropolitan University, South Africa.
3. 2014-2015: Awarded the Nelson Mandela Metropolitan University Postgraduate Research Scholarship (NMMU-PGRS), South Africa.

Special Awards

2009: Certificate of Merit for being the top best performing student, Physics Major, Moi University, Kenya.

Employment Responsibilities – Former and current

Current: Sep., 2017 to date: Currently a Lecturer of Physics at the Department of Physical Sciences, School of Pure and Applied Sciences, Machakos University.

Previous: Postdoc researcher at Nelson Mandela Metropolitan University (Feb, 2017-date), Tutorial and Lab demonstrator at Nelson Mandela Metropolitan University, South Africa (2014-2016).

Administration: Currently the Examination and Timetable Coordinator, Department of Physical Sciences, School of Pure and Applied Sciences, Machakos University.

Teaching Areas: *Physics for engineers, Mechanics, Electronics, Electricity and Magnetism, Electrodynamics, Lasers and Optics, Semiconductor Physics and Telecommunication Systems.*

Research Interests: Laser optics and applications to optical fibre communication systems, backbone optical fibre transport networks, fibre to the home (FTTH) and passive optical networks (PONs).