

MOSEBETSI LEOTLELA

PRSCINAT, PRTECHENG, PRPHYS, MIPET

CONTACT



EDUCATION

2011 - 2016

UNIVERSITY OF THE
WITWATERSRAND

- Doctor Philosophy (Physics)

Title of PhD Research Project:
RITICALITY SAFETY ANALYSIS OF
THE DESIGN OF SPENT FUEL CASK,
ITS MANIPULATION AND
PLACEMENT IN A LONG-TERM
STORAGE

2008-2010

UNIVERSITY OF THE
WITWATERSRAND

- Master of Science (Physics)

Title of MSc Research Project:
*Investigation of the Release of Gaseous
Fission Products From Pebble Bed
Modular Reactor's TRISO Coated Fuel
Particle During the HFR-K5 Fuel
Irradiation Test.*

2001-2003

- Ing: Technology Management
(Hanzehogeschool ;The Netherlands)
- BTech: Technology Management ;
(Pretoria Technikon)

PROFILE

WORK EXPERIENCE

University Of The Witwatersrand, 2030 - PRESENT
Johannesburg
Visiting Researcher

- Develop and execute comprehensive marketing strategies and campaigns that align with the company's goals and objectives.
- Lead, mentor, and manage a high-performing marketing team, fostering a collaborative and results-driven work environment.
- Monitor brand consistency across marketing channels and materials.

University of the February 2021 -
Witwatersrand December 2023
Honorary Lecturer

Mentored students to support achievement of target grades.
Supervised student projects, facilitating progress and encouraging deeper learning through application.
Responded to student enquiries and concerns to undertake action and suggest alternative avenues of support.
Held regular student meetings to communicate strengths, weaknesses

Eskom (Nuclear New Build Program) April 2013-
March 2023
Nuclear Licensing Physicist

- Source term analysis of the proposed reactor technology, e.g. EPR, AP1000, and VVER, using SCALE6 computer code.
- Review of the Site Safety Report (SSR) for the proposed nuclear site; review of the Environmental Impact Analysis (EIA) report from the environmental practitioner.
- Review of the Environmental Impact Analysis (EIA) Report from the environmental practitioner.
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1989-1996

- National Diploma: Nuclear Technology (Pretoria Technikon)

SKILLS

During my career in the nuclear industry, I conducted nuclear criticality safety calculations for the CASTOR casks using KENO VI, with the aim of determining whether they could be used for fuel assemblies with enrichment levels higher than 3.5%. The project was initiated to help alleviate the ongoing spent fuel pool congestion by removing some fuel assemblies and storing them in the casks.

In addition to nuclear criticality safety analyses, I also perform radiation shielding calculations for spent fuel casks using the SCALE code. I conduct sensitivity and uncertainty (S/U) analyses on various nuclides using the TSUNAMI module of SCALE to determine which nuclide cross-sections are most sensitive to specific parameters. These parameters may include, among others, moderator temperature and the corresponding impact of sensitivity and uncertainty on the final k_{eff} .

When I transitioned to academia, my key responsibilities included:

- Student support
- Academic writing
- Research paper development
- Student performance evaluation
- Data collection and interpretation
- Research and analysis
- Institutional collaboration
- Scientific writing
- Peer review experience
- Research design
- Academic publishing
- Subject matter expertise
- Data analysis
- Research data analysis
- Educational technology use
- Academic publication

Nuclear Analysis Services (NAS)

August 2010-
March 2013

Nuclear Physicist

- Criticality Safety Analysis Of Spent Fuel Casks.
- Heat load calculations for reload
- Review of Koeberg Emergency Planning Procedures
- Shielding Calculations with SCALE Computer Code

1 July 2005-

1 August 2010

PBMR Client Office (Eskom)

Nuclear Nuclear Engineer

- Review and Co-ordination of PBMR EIA
- Rezoning of PBMR Nuclear Site.
- PERMITS application for PBMR nuclear site and Reactor Design.
 - -NERSA for licensing electricity generation.
 - -Non-Proliferation Council: For the issuance of Dual Use Items: (DME in case of nuclear materials and DTI for non-Nuclear Materials)
 - -DWAF for water-related licence
 - -NNR for Nuclear Licence
- ANALYSIS
 - Groundwater
 - PBMR Source Term calculation
 - PBMR Emergency Plan Program
 - Review of PBMR Site Safety Report (SSR)
 - Compilation/Author of PBMR Safety Case Chapters
- RADIATION PROTECTION AND EMERGENCY PLANNING
 - Played a significant role in the review of the strategy for selection of radionuclides for siting of PBMR and other nuclear reactor and the review of PBMR Technical Basis of Emergency Planning i.e. selection of the scenario accident scenario for which the Emergency Planning Program must be viable for and calculation of the associated dose.
 - Source Term: Review of PBMR Source Term and related Radiation Protection Program.
 - Review of nuclear site's Site Safety Report (SSR), Technical Specification (Techspec), Position Papers formed part of my adhoc type of work.
 - iv. Facilitation of Verification And Validation Of Computer Codes-CAP88 , for which I compiled the V & V URS and Identification and Selection of service providers that could perform the V&V were all done under the RP umbrella

National Nuclear Regulator

September 1995-
30 July 1998

Radiation Protection Officers (Emergency Planning)

- Review of Koeberg and NECSA emergency Plan Procedures
- Facilitation and Co-ordination of Koeberg and NECSA emergency exercises
- NNR Representative in various emergency Planning Public Forum

AWARDS

- Quality Achiever Award (October 14, 2008) – Presented in recognition of the Pebble Bed Modular Reactor (PBMR) Environmental Impact Assessment (EIA) Response Review.
- Golden Key International Honour Society – Lifetime Membership.
- International Best Researcher Award (June 4, 2022) – ISSN International Research Awards (IIRA-2022).
- Nominee – Founder of the Year Award (FOYA), Southern Africa 2025.

AFFILIATIONS

1. Engineering Council of South Africa, Professional Engineering Technologist, 201070081
2. Institute of Professional Engineering Technologists, MIPET, 3156M
3. The South African Council of Natural Scientific Profession, Pr.Sci.Nat, 400085/11
4. South African Institute of Physics, MSAIP, 201029
5. Southern African Radiation Protection Association, Founder Corporate Member
6. Golden Key International Society, 15291686
7. International Association of Applied Science And Technology, Certificate Of Conference Committee Member, 2022-08-03
8. International Conference on Physics and Network-Helics Group, Member of

Hickson Performance Chemicals (Pty) Ltd
(Now Akulu Maschon)

March 1992-
30 March 1994

Chemical Plant Operator

- Operation of a continuous Berrol Sulphonation Plant,
- Operation of a continuous neutraliser,
- Batch distillation of products including:
 - Xylene Sulphonic Acid;
 - Para-toluene Sulphonic Acid;
 - Benzoil Sulphonic Acid and
 - Ether sulphates
- Laboratory Analyses Work
 - Laboratory Analysis of finished and Semi Fished products for;
 - Water content (Karl-Fischer);
 - Total Acid Value (titration);
 - Free Sulphuric Acid;
 - Activity level (Metrohm auto titrator)

Schonland Nuclear Research Centre (Wits
University)

January 1990-
December 1991

Technician

- Maintenance Technician for:
 - The Tandem Particle Accelerator;
 - Walton Cockroft Accelerator
 - Proton Microprobe;
 - Ion Inplanter.
- Data capture for PIXE experiments
- Vacuum maintenance in preparation for all experiments;

Plascon Paint Company Pty LTD

January 1987-
Juner 19891

Laboratory Technician (QC and R&D)

- Quality Control Functions
 - QA and QC on all paint raw material and finished and Paint products for
 - Viscosity
 - Density
 - Rheology
 - Flowrate
 - Hiding Power
 - Research and Development
 - Research for new wood coating, varnish and decorative paints
- Supervision of manufacturing of new products

Vadek Paint Company (Pty) Ltd

January 1985
January 19871

QC Laboratory Technician

- Quality Control Functions
 - QA and QC on all paint raw material and finished and Paint products for
 - Viscosity, Rheology, Flowrate
 - Hiding Power, Gloss, Reflectance

Summary

Dr. Leotlela – Nuclear Technologist |
Computational Physicist |
Entrepreneur

Dr. Leotlela is a distinguished nuclear technologist with a robust background spanning nuclear regulation and licensed nuclear plant operations. His expertise extends beyond reactor systems into the domain of experimental physics, with hands-on experience operating sophisticated particle accelerators such as the Tandem, Walton-Cockcroft, Ion Implanter, and Proton Microprobe.

A computational physicist by academic training, Dr. Leotlela has published extensively in the field of nuclear engineering, both as a lead author and in collaboration with fellow researchers. His work prominently features advanced simulation tools and Monte Carlo techniques, utilizing industry-standard codes such as MCNP and SCALE, as well as other deterministic modeling software. This rare combination of practical experimental knowledge and high-level computational expertise positions him as a uniquely capable and versatile expert in the nuclear science and technology sector.

Beyond the lab and lecture hall, Dr. Leotlela is a proven entrepreneur. He has founded and currently directs multiple successful ventures, a testament to his strategic thinking, business insight, and drive to innovate. His entrepreneurial accomplishments reflect not only his technical excellence but also his ability to lead, inspire, and build sustainable enterprises.

With a blend of technical depth, academic rigor, and commercial savvy, Dr. Leotlela stands out as a dynamic force in nuclear technology and innovation.

Publications

- DERIVATION OF THE SENSITIVITY COEFFICIENTS OF RADIOLYSIS SPECIES BY DIRECT PERTURBATION: A TEMPERATURE DEPENDENCE PERSPECTIVE, Going through the Review process.
- QUANTIFYING THE CORRELATION BETWEEN THE NEUTRON MULTIPLICATION FACTOR AND THE SPATIAL ARRANGEMENT OF SPENT FUEL CASKS IN A SPENT FUEL STORAGE FACILITY Going through the Review process.
- SPACE-TIME DEPENDENCE OF THE NEUTRON MULTIPLICATION FACTOR IN SPENT FUEL STORAGE, International Conference Physics and Its Application, 2023-07-17
- Radiolysis of water by α - and β -particles from spent nuclear fuel facility, Journal of Physics and Chemistry, Accepted, 2023-10-24
- Time-Dependent Variations In The Radiological Health Impact Of An Interim Spent Fuel Storage Facility, Journal of Physics and Chemistry, Accepted, 2021-06-04
- Establishing an Effective Nuclear Regulatory Regime: A Case Study of South Africa, Journal of Science, Technology and Public Policy, 2021-03-04, <http://www.sciencepublishinggroup.com/journal/paperinfo?journalid=518&doi=10.11648/j.stpp.20210501.11>
- Prediction of dose rates around the interim spent fuel storage facility, Journal of Physics and Chemistry, Accepted, 2020-08-31
- Sensitivity Of The Neutron Multiplication Factor To Water Ingress Into A Spent Fuel Cask, Kerntechnik Journal, 85, 2020
- Methodology For Licensing Burnup Credit In Nuclear Criticality Safety Analysis: A Calculational Basis, 2019-04-23, <https://www.semanticscholar.org/search?q=MJ%20Leotlela&sort=relevance>
- Preserving Spent Fuel Storage Capacity By Taking Credit For Burnup In Nuclear Criticality Safety Analysis: An Alternative Solution To Spent Fuel Storage Shortage, Journal of modern and applied physics, 2018, 2, 1, 10-12
- Time-dependent variation of the neutron multiplication factor in spent fuel storage, Kerntechnik Journal, 2017, 82, 6
- Evolution of South African Nuclear Regulatory regime from the British nuclear regulatory system, Journal of modern and applied physics, 2017, 1, 1, 01
- Preferential water ingress into dry spent fuel casks, J Nucl Ene Sci Power Generat Technol, 2016, 5, 4, 10.4172/2325-9809.1000159
- The effects of storage patterns on the neutron multiplication factor of spent nuclear fuel casks, International Journal of Nuclear Safety, 2012, 1, 1
- Effects of the localisation of misloaded fuel assembly on the neutron multiplication factor of castor/28F spent fuel casks, International Nuclear Safety Journal, 2015, 4, 1
- Ranking of Aluminium composite materials for use as neutron absorber inserts in spent fuel pools, International Journal of Nuclear Safety, 2015, 4, 3
- Sensitivity analysis of parameters important to nuclear criticality safety of castor X/28F spent nuclear fuel, Kerntechnik Journal, 2015, 80, 5
- Criticality effect of storage of patterns of spent fuel casks, SA Institute of Physics Conference, 2012
- The Effects of Silicon Carbide crystal structure transformation on gaseous Fission Product release from the TRISO coated Particle of the Pebble Bed Modular Reactor's Fuel Pebble, South African Institute of Physics Conference, 2010

References

- Prof Ivo Petr, [REDACTED]
- Mr. Tshepo Olifant [REDACTED]
 - [REDACTED]
 - [REDACTED]

ENGLISH LANGUAGE FLUENCY
TEST (Graduate Record Exam
(GRE Score

Spoken: Excellent
Written: Excellent
Reading: Excellent

AFRIKAANS LANGUAGE FLUENCY

Spoken: Excellent (2nd language)
Written: Excellent (2nd language)
Reading: Excellent (2nd language)

Directorship of Private Companies

**Founder and Owner (2016): Black Swallow Guesthouse
(Pty) LTD**

website:<https://blackswallowguesthouse.co.za/>

email: [REDACTED]

**Founder and Owner (2023): NEUTRONIX NUCLEAR
CONSULTING SERVICE**

[REDACTED]
Website: <https://neutronixconsulting.co.za/>

Contact details:
[REDACTED]

Personal Information

Professional Title: Dr

Gender: Male

PARTICIPATION IN INTERNATIONAL JOURNALS

- Editor: International nuclear safety Journal:
<http://nuclearsafety.info/international-nuclear-safety-journal/index.php/INSJ/about/editorialTeam>.
- Section Editor: International nuclear safety Journal
- Member of the Editorial Board: Journal of Modern Applied Physics (Resigned).
<https://www.pulsus.com/journal-modern-applied-physics.html>
- Reviewer of a number of Journals in Nuclear Sciences
 - Journal of Radioanalytical and Nuclear Chemistry:
<https://link.springer.com/journal/10967>.
 - Nuclear Science and Engineering (NSE),
<https://www.ans.org/pubs/journals/nse/>
 - Journal of Nuclear Engineering And Design:
<https://www.sciencedirect.com/journal/nuclear-engineering-and-design>

RESEARCH INTERESTS

- Nuclear Fission Reactors
- Nuclear Fusion Reactors
- Nuclear Criticality Safety Analysis,
- Radiation shielding
- Radiation induced material degradation.
- Radioactive waste management
- Hydrogen Energy Generation(HEG)
- Hydrogen Storage

OTHER RELATED TRAINING COURSES

- 2011: NECSA: Introduction to the Theory and Practice of Computational Radiation Transport, Radiation Shielding and Nuclear Criticality: (10-14 Jan 2011)
- 2011: Oak Ridge National Laboratory: Scale Training Course in Criticality Safety: (April 2011)
- 2009: Penn State University-PBMR: Postgraduate Advanced (Reactor Core) Thermal-Hydraulics seminar (13-17 July 2009)
- 2008: National Academy for Nuclear Training (INPO): Certificate Of Achievement (Next Level Leadership Seminar for Nuclear Managers) 28/02/2008
- 2008: Key Issues In The World Nuclear Industry Today World Nuclear University (2-6 June 2008)
- 2008: Engineering & Construction Contracts Course (June 2008) TCQ Strategies:
- 2007: Environmental Risk Management (North West University (16-20 July 2007)
- 2007: Internal And Supplier Auditor Training Course (Wynleigh International (10-12 Sept 2007))
- 2007: Environmental Impact Assessment (North West University (19-23 Nov 2007))
- 2004: IAEA/AFRA (30 August-3 September 2004): Regional (AFRA) Training Course On The Security Of Radioactive Sources.
- 2003: IAEA/GRS mbH (27/09/2003-1/10/2003) Regional (AFRA) Workshop on Nuclear Security Issues.
- 1997: Interregional Training Course on Planning, Preparedness and Response for Nuclear and Radiological Emergencies IAEA/ANL (28-16 May 1997).
- 1996: Regional (AFRA) Training Workshop On Environmental Radiation Measuring Networks IAEA/NECSA (24-28 June 1996):