Manifesto: SAIP Student Representative – NPRP Division

Candidate: Thabo James Lepota

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I am honoured to stand as a candidate for Student Representative to the South African Institute of Physics (SAIP) Council, representing the Nuclear, Particle, and Radiation Physics (NPRP) division.

Vision

To strengthen student representation, participation, and development within the NPRP division—building an inclusive, innovative, and supportive research community.

Goals

- Advocate for student interests and ensure their voices are heard at Council level.
- Improve access to research opportunities, workshops, and national conferences for NPRP students.
- Promote collaboration and peer support through seminars, online platforms, and mentorship initiatives.
- Champion diversity, equity, and inclusion, ensuring the NPRP field is welcoming to all.
- Encourage involvement in outreach that highlights the societal value of physics.
- Collaborate with academic and research leaders to enhance funding, resources, and guidance for students.

Experience & Commitment

As a committed physics student with a passion for NPRP and active involvement in academic life, I understand the challenges we face whether academic, financial, or institutional. I am dedicated to representing your interests, ensuring transparent communication, and delivering meaningful feedback to the SAIP Council.

With your support, we can build a more connected and empowered student community within the NPRP division and beyond.

Thank you for your consideration.

Thabo James Lepota

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Curriculum Vitae – Thabo James Lepota

Personal Information

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Citizenship: South African | Driver's License: Code 10 (C1)

Career Objective

As a 2nd-year PhD candidate in Particle Physics at the University of the Witwatersrand, I am committed to advancing high-energy physics research through precision detector studies, machine learning integration, and collaborative development within the ATLAS experiment at CERN. My goal is to contribute to impactful scientific advancements while fostering mentorship and representation within the physics community.

Education

- PhD in Particle Physics – University of the Witwatersrand (In Progress, 2nd Year)
  Research focus: ATLAS High Granularity Timing Detector (HGTD) validation and performance studies; Particle Flow Algorithm for forward region jet reconstruction; ML-based physics analysis.
- MSc course work and research report – University of the Witwatersrand (Project under review)
  Research report: Transition from 2D/3D-CRT to IMRT/VMAT: A review of treatment planning and dosimetric aspects
- MSc in Physics – University of the Witwatersrand (Graduated December 2022)
  Thesis: Development of the Burn-in Test Station for the ATLAS Tile Calorimeter Low Voltage Power Supplies
- BSc Honours in Geophysics – University of the Witwatersrand (Completed December 2018)
  Project: Signal Processing GPS Data of AFRICA ARRAY Stations
- BSc in Nuclear Science and Engineering – University of the Witwatersrand (Completed December 2017)
- Mampoi High School (Completed December 2010)
  Focus on Mathematics, Physical Sciences, and Life Sciences.

Research Experience

- Contributor to the ATLAS High Granularity Timing Detector (HGTD) Project – Phase II Upgrades: Validation of demonstrator modules, data quality analysis, and performance benchmarking.
- Particle Flow Algorithm (PFA) for Forward Region Jet Reconstruction: Evaluation of ITk detector setup performance at the HL-LHC.

- Machine Learning applications in physics analysis – optimization of event reconstruction and anomaly detection.
- Active involvement in the ATLAS collaboration under supervision of Prof. Bruce Mellado (Wits/CERN).

Teaching & Leadership

- Tutorial Coordinator – Applied Physics (Statics Mechanics & Mathematical Modelling), University of the Witwatersrand.
- Laboratory Demonstrator – Experimental Physics Labs (Setup, demonstration, and supervision of student experiments).
- Mentor – Bridge the Gap Program (supporting undergraduates in mathematics and physics).
- Presenter and lead author of two SAIP2025 conference talks on HGTD validation and PFA forward jet reconstruction.
- Outreach volunteer in schools promoting physics and coding education.

Technical Skills

- Programming: Python, C++, MATLAB
- Data Analysis: ROOT, Scikit-learn, TensorFlow
- Detector Systems: ATLAS HGTD, TileCal, ITk
- Laboratory Techniques: Equipment calibration, data acquisition, electronics testing
- Software: Microsoft Office, LaTeX, Git
- Languages: Fluent in Sesotho and English; basic Afrikaans.

Conferences & Presentations

- SAIP2025 – 'Ongoing Validation of the High Granularity Timing Detector (HGTD) Demonstrator for the ATLAS Phase II Upgrades'
- SAIP2025 – 'Particle Flow Algorithm (PFA) for Forward Region Jet Reconstruction with the ATLAS ITk Detector Setup at the HL-LHC'
- SAIP2021 – 'Development of Test Stations for the ATLAS Tile Calorimeter Low Voltage Power Supplies'

Previous Employment

- Tile Calorimeter Maintenance Assistant – CERN (Mar 2019 – Oct 2020): Assisted in maintenance and data quality validation of detector modules.

References

Dr. Mukesh Kumar – PhD supervisor, Wits

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Dr. Rachid Mazini – PhD supervisor, Wits/CERN

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Prof. Bruce Mellado – MSc supervisor, Wits/CERN

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