Paper Submission Form - SAIP2025 Proceedings

Sections A, C, D, and E must be completed by all authors (including students) who submit papers. Section B is compulsory for students who submit manuscript(s).

Section A: Paper Submission Information

Paper/Abstract ID	#377
Paper title	Analysing h to Zy decay at the Large Hadron Collider using SMEFT
Corresponding Author Name & Surname:	Njokweni Mbuyiswa
Corresponding Author Email Address:	2314612@students.wits.ac.za

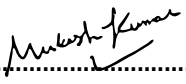
Section B: For Students & Supervisors

Supervisor Name & Surname:	Dr Mukesh Kumar
Supervisor Email Address:	mukesh.kumar@wits.ac.za

For this paper, the supervisor must agree/disagree with the following statements.

	Yes	No
1. I am aware that the above-mentioned paper is being submitted for possible publication in the Proceedings of the SAIP Conference. I am satisfied that the presented work is that of the listed authors. I hereby give consent to the submission	X	
2. I have proof-read the manuscript	X	
3. I am satisfied that the manuscript is written in appropriate English and is sufficiently free of grammatical and spelling errors	X	
4. I am familiar with the required manuscript format ("House Style"), and I am satisfied that this manuscript meets the criteria. I am aware that manuscripts not conforming with House Style may be desk rejected	X	
5. I am satisfied that the scientific content of this manuscript is of sufficient standard for it to be considered for publication in the Proceedings of the South African Institute of Physics Conference Proceedings	X	

Student Name & Surname: Njokweni Mbuyiswa **Signature:**  **Date:** 31/07/2025

Supervisor Name & Surname: Mukesh Kumar **Signature:**  **Date:** 31/07/2025

Section C: Suggested Reviewers

Obtaining the two referee reports necessary for DHET subsidy is an onerous task.

Please provide the names and contact details of three qualified South African and/or international referees. Referees should have a PhD and expertise in the relevant area of Physics. Do not recommend referees who have co-authored a work with any of the authors on the manuscript within the past five (5) years. Manuscripts without three recommended referees may be subject to desk rejection.

Suggested Reviewers in your Research Field (Both local & international)		
	Reviewer Names & Surname	**Reviewer's Email Address(es)**
Suggested reviewer #1	Dr Satendra Kuma	satendrak@iiitu.ac.in
Suggested reviewer #2	Dr Ammar	amari@uhb.edu.sa
Suggested reviewer #3	Dr Vaibhav Rawoot	vaibhavrawoot@gmail.com

Section D: Declaration of Novelty and Use of AI

How is this submitted manuscript scientifically novel?

This study presents a novel analysis of the rare Higgs decay process into a Z boson and photon using the Standard Model Effective Field Theory framework. It explores constraints on dimension-six Wilson coefficients by analyzing gluon-gluon fusion production of the Higgs boson and the decay process. The novelty lies in the use of both inclusive and bin-by-bin differential cross-section Chi-squared analyses, incorporating multivariate techniques like Random Forest classifiers and Markov Chain Monte Carlo methods to extract credible intervals. Furthermore, the study expands the sensitivity by considering multiple Z decay channels and future extensions to alternative Higgs production modes.

Please see the Author Guidelines for the AI use policy.

How was AI used in the generation of this manuscript?

AI was not used to generate any part of the scientific content, figures, or data analysis in this manuscript. The analysis, simulations, and result interpretations were performed manually by the authors using standard high-energy physics tools such as MadGraph5, Pythia8, Delphes3, FastJet. However, AI-based tools were used for minor language suggestions and for checking grammar consistency. No content generation or scientific reasoning was outsourced to AI, and all critical analyses and results were authored by the research team.

Section E: Plagiarism

	Yes
I am aware that plagiarism detection software may be used on my manuscript.	X