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	#373
Paper title	Monte Carlo generation involving searches for scalar resonances with diphoton in association with tau+ tau-/2 b-jets in ATLAS detector at the LHC
Corresponding Author Name & Surname:	Njokweni Mbuyiswa
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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 Edward Nkadimeng	edward.khomotso.nkadimeng@cern.ch
Suggested reviewer #2	Dr Bo Liu	b.liu@cern.ch
Suggested reviewer #3	Dr Luca Fiorini	Luca.Fiorini@cern.ch

Section D: Declaration of Novelty and Use of AI

How is this submitted manuscript scientifically novel?

This manuscript presents the first dedicated Monte Carlo generation campaign for a simplified 2HDM+S model involving the resonant production of scalar particles decaying into diphoton and 2 taus or b-jet final states at the electroweak scale, using the process gluon gluon fusion to a heavy higgs to two lighter scalars, S and S'. The signal topology and mass benchmarks are motivated by recent anomalies in multi-lepton and diphoton channels observed by ATLAS and CMS. The study incorporates truth-level selections, custom b-jet definitions, and Run 3 pile-up conditions in both FullSim and AF3 simulations. This campaign will enable kinematic optimization and sensitivity studies for new physics scenarios not captured by standard Higgs sector models along with laying the groundwork for future reinterpretation efforts and anomaly resolution.

Please see the Author Guidelines for the AI use policy.

How was AI used in the generation of this manuscript?

AI tools were not used for any part of the physics analysis, simulation setup, event generation, or validation. All physics content, figures, and computational workflows were developed manually using standard tools in high-energy physics MG5, Pythia8, and ROOT. AI assistance was only used in minor editorial refinement, such as grammar polishing and language suggestions, to improve the clarity and flow of the text. The scientific reasoning, technical content, and conclusions were all produced independently by the authors.

Section E: Plagiarism

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