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	401
Paper title	Preparing for Diphoton Resonance Searches in the Leptonic, 0-tau Final States: Event Selection and Background Characterization Using ATLAS Run 3
Corresponding Author Name & Surname:	Kgothatso Tshepo Ntumbe
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Section B: For Students & Supervisors

Supervisor Name & Surname:	Bruce Mellado
Supervisor Email Address:	bruce.mellado@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: Kgothatso Ntumbe **Signature: .....** **Date: 31/07/2025**

Supervisor Name & Surname: Bruce Mellado **Signature: .....** **Date:** 31/07/25

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	Mohamed Belfkir	Mohamed.Belfkir@cern.ch
Suggested reviewer #2	Hassnae El Jarrari	hassnae.el.jarrari@cern.ch
Suggested reviewer #3	Edward Nkadimeng	edward.khomotso.nkadimeng@cern.ch

Section D: Declaration of Novelty and Use of AI

How is this submitted manuscript scientifically novel?

This manuscript presents a new approach to preparing ATLAS Run 3 searches for physics beyond the Standard Model in the diphoton plus multilepton final states

The novelty lies in the focused development and validation of event selections in the $\gamma\gamma$+1ℓ and $\gamma\gamma$+2ℓ, 0-τ channels using detailed studies of Standard Model backgrounds

, particularly $t\bar{t}\gamma\gamma$ events. By leveraging the Easyjet framework and adapting it for Run 3 readiness, the analysis lays a foundation for upcoming signal integration.

The work also provides optimized kinematic distributions and object-level studies essential for defining sensitive BSM search regions based on current theoretical models

like the 2HDM+S.

Please see the Author Guidelines for the AI use policy.

How was AI used in the generation of this manuscript?

No generative AI tools were used for data generation, analysis, or core scientific interpretation. AI assistance was limited to language refinement and formatting support

during the preparation of the manuscript. All scientific content, including event selection design, code implementation within Easyjet, and interpretation of results,

was produced by the author based on existing ATLAS data and simulation tools, in compliance with collaboration standards.

Section E: Plagiarism

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