

# 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	014
Paper title	Computational fluid dynamics study of turbulence effects in a heat pipe heat exchanger for Power-Cell Micro-reactor
Corresponding Author Name & Surname:	Katlego Pule
Corresponding Author Email Address:	katlegopule59@gmail.com

## Section B: For Students & Supervisors

Supervisor Name & Surname:	Emmanuel Igumbor
Supervisor Email Address:	emmanuel.igumbor@gmail.com

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	✓	
2. I have proof-read the manuscript	✓	
3. I am satisfied that the manuscript is written in appropriate English and is sufficiently free of grammatical and spelling errors	✓	
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	✓	
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	✓	

Student Name & Surname: Katlego Pule Signature:  Date: 31/07/2025

Supervisor Name & Surname: Emmanuel Igumbor 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	Igle Gledhill	igle.gledhill@wits.ac.za
Suggested reviewer #2	Malebogo Ngoepe	malebogo.ngoepe@uct.ac.za
Suggested reviewer #3	Indresan Govender	govenderi5@ukzn.ac.za

## Section D: Declaration of Novelty and Use of AI

### How is this submitted manuscript scientifically novel?

This study introduces a novel CFD investigation of a newly designed Heat Pipe Heat Exchanger (HPHE) tailored for power-cell micro-reactors. The design uniquely addresses tritium contamination while improving thermal effectiveness. By comparing LES and k- $\epsilon$  turbulence models, the study reveals significant temperature reductions for helium (from 1023 •K to 500• K with LES and to 723•K with k- $\epsilon$ ), and notable temperature increases for air. This is the first CFD study to apply advanced turbulence modeling to evaluate both safety and cooling performance in micro-reactor HPHEs, establishing a new benchmark for thermal management in compact nuclear systems.

**Please see the Author Guidelines for the AI use policy.**

### How was AI used in the generation of this manuscript?

Grammarly was used to assist with grammatical errors and syntax corrections.

## Section E: Plagiarism

	Yes
I am aware that plagiarism detection software may be used on my manuscript.	<input checked="" type="checkbox"/>