

Paper Submission Form - SAIP2026 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 A MANUSCRIPT.

Section A: Paper Submission Information^{*}

Paper/Abstract ID	084
Paper Title on Indico	Thermodynamics of Quantum Fields on a Finite Lattice
Submitted Paper Title (if different from Indico)	
Corresponding Author Name & Surname:	Rens Roosenstein
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Section B: For Students & Supervisors[†]

Supervisor Name & Surname:	William Horowitz
Supervisor Email Address:	wahorowitz@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: Rens Roosenstein

Signature:  Date: 06-08-2026

Supervisor Name & Surname: William Horowitz

Signature:  Date: Aug 6, 2026

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	Anosh Joseph	anosh.joseph@wits.ac.za
Suggested reviewer #2	Herbert Weigel	weigel@sun.ac.za
Suggested reviewer #3	Sam van Leuven	sam.vanleuven@wits.ac.za

*: Required section
 †: Required section for students

Section D: Declaration of Novelty and Use of AI^{*}

How is this submitted manuscript scientifically novel?

The scientific novelty of this manuscript lies in the rigor and control of the derivation by doing a first-principles lattice construction of finite-volume corrections to the thermodynamics of free massive scalar fields at finite temperature. Most existing treatments only consider the massless case and we have only seen those derivations in the continuum. By carrying out the derivation entirely on the lattice, we obtain a mathematically controlled framework that is intended to serve as the foundation for future extensions to interacting field theories. In addition, we introduce a counterterm renormalization procedure in a free thermal field theory. Although such an approach is uncommon in the free theory, it provides a natural bridge to the counterterm renormalization required for interacting quantum field theories.

Please see the Author Guidelines for the AI use policy.

How was AI used in the generation of this manuscript?

This manuscript was first written as a completed draft by Rens Roosenstein. After having written the full manuscript, ChatGPT and Gemini were used to do a final grammar and sentence structure check.

Section E: Attestation, Plagiarism, and Reviewer Availability^{*}

	Yes
The author attests that the work reported in this manuscript reflects the material presented at the SAIP2026 conference.	X

I am aware that plagiarism detection software <u>WILL</u> be used on my manuscript.	X
By submitting a manuscript to the Proceedings, the author agrees to serve as a referee for the Proceedings. Student authors are encouraged to referee, with guidance and support of a supervisor.	X

*: Required section