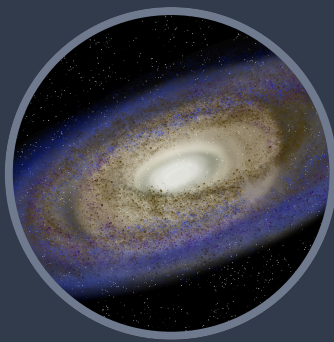




SOFIE RIED

PHD CANDIDATE

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Education

PhD in Mathematics

2024 - 2027

University of Sheffield

Supervisor: Steffen Gielen

M.Sc. Physics

2021 - 2023

Georg-August Universität Göttingen

Supervisor: Francesca Vidotto

B.Sc. Mathematics

2019 - 2023

Georg-August Universität Göttingen

Supervisor: Victor Pidstrygach

B.Sc. Physics

2017 - 2021

Georg-August Universität Göttingen

Supervisor: Karl-Henning Rehren

Awards

- Poster prize at the "New Directions in Semiclassical Gravity" workshop in York
- Second prize in the poster competition at the "Causal Fermion Systems 2025" workshop in Regensburg
- Dr. Berliner-Dr. Ungewitter award for outstanding master's graduates
- Scholarship by the German Academic Scholarship Foundation

Publications

Gielen, Steffen and Sofie Ried (2026).
"Unimodular boundary time for Regge calculus".
arXiv: [2610.03479](#) [gr-qc].

Gielen, Steffen and Sofie Ried (2026).
"Cyclic Kruskal universe: A quantum-corrected Schwarzschild black hole in unitary unimodular gravity".
In: Phys. Rev. D 113.2, p. 026030. DOI: [10.1103/kpf8-52c9](#). arXiv: [2509.18273](#) [gr-qc].

Gielen, Steffen and Sofie Ried (2025).
"Quantum Schwarzschild-(A)dS black holes: unitarity and singularity resolution".
In: JHEP 06, p. 074. DOI: [10.1007/JHEP06\(2025\)074](#). arXiv: [2502.10104](#) [hep-th].

Ried, Sofie (Aug. 2025).
"Singularity Resolution of Quantum Black Holes in (A)dS".
In: J.Phys.Conf.Ser. 3177 (2026) 1, 012133. DOI: [10.1088/1742-6596/3177/1/012133](#). arXiv: [2508.20794](#) [gr-qc].

Etkin, Altay & Gielen, Steffen & Rassouli, Farbod-Sayyed & Ried, Sofie (in preparation).
"The role of orientation in minisuperspace".

Martín-Benito, Mercedes & Menéndez-Pidal, Lucía & Neves, Rita & Ried, Sofie (in preparation).
"Unimodular Loop Quantum Cosmology".

Research visits

WOST research visit

Madrid Oct.-Nov. 2026

Funded by the WOST collaboration I am visiting researchers at IEM (Francesca Vidotto and Eugenio Bianchi) and UCM (Mercedes Martín-Benito and Daniele Oriti) to collaborate on multiple projects.

Masters thesis project

University of Western Ontario Mar.-May 2023

Funded by the German Academic Scholarship Foundation I visited Francesca Vidotto, the external supervisor of my masters project, to work on my masters project titled "Correlation of Cosmological Primordial Perturbations and their Relation to Spinfoams".

Service & Leadership

Piscopia committee

University of Sheffield 2025 - today

As a co-founder of the Sheffield local committee I organise events and try to encourage mathematics undergraduates of underrepresented genders to pursue a PhD.

PhD student representative

University of Sheffield 2024 - today

I represent the interests of all PhD students in the School of Mathematical and Physical Sciences and help organise events, such as a monthly pub quiz.

Faculty Board

Georg-August Universität Göttingen 2020 - 2023

I represented student interests on questions concerning e.g. financial and staff decisions.

Student Council

Georg-August Universität Göttingen 2018 - 2022

As an elected member I have overseen many projects ranging from event organising to quality management.

Board of Studies

Georg-August Universität Göttingen 2018 - 2021

I represented student interests on questions concerning e.g. course evaluations and the design of the curriculum.

Teaching Experience

Teaching Assistant & Associate

Oct 2024 - Aug 2026

University of Sheffield

I led and assisted in leading tutorials for a wide range of courses including first and second year maths courses on partial differential equations and mathematical modelling, first and second year maths for engineers and maths for foundation year students (year 0). Additionally I marked homework, graded group projects and assisted with masters dissertations.

Supervision of research project

Jun 2025 - Jul 2025

University of Sheffield

I proposed and planed a four week research project for a second year maths undergraduate student on black hole singularities. I then supervised the completion of the project, including the design of a poster and a presentation.

Mentor

Jun 2022 - Jan 2023

Georg-August Universität Göttingen

I was the personal mentor for a second year physics student. I assisted with homework, writing lab reports, studying for exams and in general navigating the degree.

Teaching Assistant

Sep 2020 - Mar 2023

Georg-August Universität Göttingen

I prepared and led tutorials and marked homework for the preparatory course and mathematics III for physicists. The first covered basic concepts needed for first year physics (complex numbers, matrices, series...) and the second included complex analysis, partial differential equations, distributions and functional analysis.

Seminar talks

Taking time to the boundary: Unimodular Regge calculus

ILQGS

06.10.2026

In this talk I introduce unimodular Regge calculus and highlight it's advantages compared to textbook Regge calculus.

Unimodular time in (quantum) gravity

UCM/IEM Madrid

09./11.06.2026

In this talk I motivated how using unimodular time as a clock might help solve some of the issues and open problems regarding time in (quantum) gravity.

Unimodular time in black holes

University of Nottingham

24.03.2026

In this talk I showed how imposing unitarity with respect to unimodular time leads to a singularity free quantum corrected Schwarzschild spacetime.

Quantum resolution of the Schwarzschild black hole singularity

University of Sheffield

28.05.2026

In this talk I took a model agnostic approach and showed that by imposing unitary evolution with respect to unimodular time we arrive at a singularity free theory, which either only has positive or only negative mass semi-classical states.

Conferences & Schools

New directions in semiclassical gravity

York 14.-17.09.2026

I presented a poster on highly nontrivial effects of imposing unitarity in minisuperspace models, which won the poster competition.

Causal Fermion Systems 2025

Regensburg 06.10. - 10.10.2025

I presented a poster on how unitarity in unimodular time resolves the black hole singularity, which won the second prize in the poster competition.

Blaumann School on LQG

Les Houches 01.09. - 12.09.2025

On different topics of current interest in the Loop Quantum Gravity community.

24th international conference on GR

Glasgow 14.07. - 18.07.2025

I gave a talk on how unitarity in unimodular time resolves the black hole singularity.

FAU² Workshop on QG across scales

Erlangen 20.05.-22.05.2025

I gave an online talk on how unitarity in unimodular time resolves the black hole singularity.

Tales of Gravity

Nottingham 07.04.-11.04.2025

I gave a talk on how unitarity in unimodular time resolves the black hole singularity.

Quantum Gravity 2023

Nijmegen 10.07. - 14.07.2023

I presented a poster on the findings of my master thesis.

Outreach activities

Good in Theory - Podcast

University of Sheffield 15.01. - 30.04.2026

Rita Neves and I recorded and produced 16 episodes of a podcast about disproven scientific theories. Topics include aether theory, Lamarck evolution and Miasma theory. We also had two guest appearances on the podcast "That's Science!" produced by the faculty of science in Sheffield. Both podcasts are available on player.sheffield.ac.uk as well as most podcast platforms.

Pint of Science

Sheffield 18.05.2026

I gave a public talk as part of the Pint of Science 2026 science festival on the topic "What happens when I fall into a black hole?". I made a comic out of the slides, which can be found on my website.