# Eleonora Svanberg

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es944@cam.ac.uk
DAMTP
University of Cambridge
Cambridge CB3 0WA
3leonora.github.io

## Research Interests

I am an applied mathematics student interested in combining pure mathematical concepts with physics. As a result, I have explored different research projects to develop the skill of using mathematical theories to solve physics problems. For example, I recently joined a working group and I am currently studying the application of number theory in string theory. In particular, I find these areas interesting to work with in the future:

- group/ring theory (sporadic groups, gauge and Galois theory etc), arithmetic/algebraic geometry (Calabi-Yau manifolds etc.),
- quantum field theory, string theory, supersymmetry

My existing research experiences demonstrate an ability to study and solve large research problems independently. Therefore, with a strong foundation in physics, I will spend my master's honing my mathematical knowledge in algebra and number theory, preparing me for a PhD in mathematical physics.

## Education

**St. John's College, University of Cambridge** — Cambridge, UK
Master's in Applied Mathematics (Part III) — 2022 -
Modules: QFT, GR, String Theory, Commutative Algebra, Algebraic Number Theory etc.
Funding: Part III International Scholarship by the Faculty of Mathematics, Swedish Engineers Scholarship 2022 etc.

**Stockholm University** — Stockholm, Sweden
BSc Physics, ECTS: A, GPA: 4.0. Top of the class. — 2019 - 2022
Bachelor thesis: Higher-order time derivative theories and the Ostrogradsky ghost supervised by Dr. Fawad Hassan

## Employments

**University of Cambridge** — Cambridge, UK
Summer Research Intern at Department of Applied Mathematics and Theoretical Physics (DAMTP) — Summer 2021
Funding: Philippa Fawcett Internship Programme 2021
Travel Grant: Swedish Astronomical Youth Association

## Research Projects

**University of Tokyo/University of Cambridge** — Remote
The project aims to explore the applications of number theory and algebraic geometry to physics, particularly string theory, black holes and supersymmetry. I am currently studying $\zeta$- and $L$-functions. — 2022 -
Supervisor: Dr. Abhiram Kidambi

**University of Cambridge** — Remote/Cambridge
By using linear analysis and perturbation theory, I have examined the wave nature of non-linear (inertial) waves in protoplanetary disks, and verified the theory by simulations using the Fawcett cluster. — 2021 - 2022
Supervisors: Dr. Can Cui, Prof. Henrik Latter
Publication in MNRAS: https://doi.org/10.1093/mnras/stac1598

**Stockholm University** — Stockholm, Sweden
Project: Optimising modelling of supernovae 1a through different colour bands, ZTF telecope — 2020
Supervisor: Prof. Edvard Mörtsell

**Royal Institute of Technology (KTH) and Atlas Experiment, CERN** — Stockholm/Geneva
High School Diploma Project: Precision Measurement of the mass of the z-boson, ATLAS open data from 2015 — 2018
Supervisor: PhD Giulia Ripellino

**Atlas Experiment, CERN** Geneva, Switzerland
Summer Student Project: Monte Carlo simulation of the small wheel upgrade of the muon spectrometer 2017
Supervisor: Dr. Edoardo Farina

## Publications

1. **Svanberg, E.**; Cui, C.; Latter, H., MNRAS 2022 Wavelike nature of the vertical shear instability in global protoplanetary disks
2. **Svanberg, E**, DiVA 2022 Higher-order time derivative theories and the Ostrogradsky ghost

## Awards, Grants and Honors

**University of Cambridge** Part III International Scholarship (£8,800) 2022
**The Society of Swedish Engineers in Great Britain** (£5,000) 2022
**VANBRUUN** Gold Scholarship (£1,000) 2022
**University of Cambridge** Philippa Fawcett Internship Programme (£4,000) 2021
**Swedish Astronomical Youth Association** Travel Grant (£300) 2021
**The King's Foundation for Young Leadership** Compass Rose Scholarship (£4,000) 2021
**The Swedish Federation of Young Scientists** Member of the Year 2018
**East Swedish Chamber of Commerce** The Future Scholarship (£300) 2017
**Swedish Astronomical Society** ESO Astronomy Camp 2016 (£1,000) 2016
**Oxford Royale Academy** Thomas Garner Bursary 2016 (£3,000) 2016

## Academic and Public Talks

**The Lise Meitner Days** Stockholm, Sweden
Talk about getting into physics research at a young age, for Swedish high school students. 2022

**The Almedalen Week** Gotland, Sweden
Sweden's annual democracy meeting. Participated in a debate about gender equality within scientific fields. 2022

**Summer Research Festival** Cambridge, UK
Presenting my mathematical research on astrophysical waves for the faculty and other students. 2021

## Coding skills

**Languages:** Python, Mathematica, LaTeX (and Overleaf), Bash, C++, C#
**Libraries:** numpy, matplotlib, snoopy, astropy, pandas
**Frameworks:** PyROOT, HEASoft, PyXspec, Athena++
**Other:** Experiences with Linux environments, and high-performance computing and simulations.

## Outreach

**Physics Ambassador for Stockholm University** Stockholm
Involved in marketing videos and produced content on their social platforms with the purpose of getting more people to study physics. 2019 - 2022

**Girls in STEM: Co-Founder** Sweden
A non-profit organisation aiming to close the gender gap in STEM (Science, Technology, Engineering and Mathematics) trough role models, workshops and a community. 2016 -
https://girlsinstem.se