

# Ruijun Lin

PURE AND APPLIED MATHEMATICS

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“Math is something challenging, but fun.”

## Education and Experiences

### Southern University of Science and Technology (SUSTech)

Shenzhen, China

RESEARCH ASSISTANT

Feb. 2024 - Aug. 2024 (Expected)

- Principal investigator: Professor Man Shun (John) Ma

### Harbin Institute of Technology (HIT)

Harbin, China

VISITING STUDENT (TALK ON THE GRADUATE SEMINAR)

Nov. 12th, 2023 - Nov. 21st, 2023

- Advisor: Professor Guixiang Hong (HIT)
- Referee: Professor Bochen Liu (SUSTech)
- Title of the talk:  $C^*$ -algebras of Left Cancellative Small Categories with Garside Families, a quick tour (based on the master's thesis)

### East China Normal University (ECNU)

Shanghai, China

VISITING STUDENT

Sep. 9th, 2023 - Sep. 13th, 2023

- Advisor: Professor Huaxin Lin (ECNU)
- Referee: Professor Søren Eilers (UCPH)

### University of Copenhagen (UCPH)

Copenhagen, Denmark

M.S. IN MATHEMATICS (AWARDED ON JUNE 22, 2023)

Sep. 2021 - Jun. 2023

- Main coursework: Functional Analysis, Introduction to Operator Algebras, Introduction to K-theory, Analysis in Quantum Information Theory and Homological Algebra
- Thesis title:  $C^*$ -algebras of Left Cancellative Small Categories with Garside Families, a quick tour (in English language)
- Thesis supervisor: **Professor Søren Eilers**
- Abstract: Recent work by Xin Li has shown how to naturally associate  $C^*$ -algebras to Garside categories and to present these as groupoid algebras for appropriately chosen groupoids, obtaining a unifying theory encompassing many important special cases. This thesis will be a quick tour of Garside theory on left cancellative small categories, as well as groupoids and  $C^*$ -algebras arising from them, containing the fundamental results, underpinning this endeavor and leading to structural characterizations, with an application to higher-rank graphs as a typical example.
- Relevant topics: Small categories, Garside categories, Inverse semigroups, Groupoids and  $C^*$ -algebras

### Southern University of Science and Technology (SUSTech)

Shenzhen, China

B.S. IN MATHEMATICS AND APPLIED MATHEMATICS (AWARDED ON JUNE 30, 2021)

Sep. 2016 - Jun. 2021

- Academic adviser: **Assistant Professor Yifei Zhu**
- Main coursework: Real Analysis, Functional Analysis, Harmonic Analysis, and Measure Theory.
- Thesis title: **Harmonic analysis and Hausdorff dimension, a brief survey** (in English language)
- Thesis supervisor: **Associate Professor Bochen Liu**
- Abstract: This thesis is a survey on various types of Fourier analysis and the interplay with Hausdorff dimension, with an application in proving the behavior of a Borel ring on the real line: either has Hausdorff dimension zero or is the whole real line.

## Attendances, Research and Talks

### Spring Operator Algebras Program, 2024

ECNU, Shanghai, China

PARTICIPANT

Apr. 8th, 2024 - Apr. 15th, 2024

- Invited Speakers: Xin Li (University of Glasgow), Kang Li (Friedrich-Alexander-Universität Erlangen-Nürnberg), Jiawen Zhang (Fudan University), etc..
- Link: <https://math.ecnu.edu.cn/ROA/events/2024%20Spring%20Operator%20Algebras%20Program/2024SOAP2.html>

### Talks and Minicourses: Young Mathematicians in $C^*$ -algebras (YMC\*A) 2023

Katholieke Universiteit Leuven,

Leuven, Belgium

PARTICIPANT

Aug. 7th, 2023 - Aug. 11th, 2023

- Minicourse lecturers: Adrian Ioana, Narutaka Ozawa, Karen Strung
- Link: <https://wis.kuleuven.be/events/YMCstarA>

## Conference: Graph Algebras

Banach Center, Będlewo, Poland

PARTICIPANT

Jul. 3rd, 2023 - Jul. 7th, 2023

- Organizers: Søren Eilers, Piotr M. Hajac and Tomasz, Maszczyk
- Link: <https://www.impan.pl/en/activities/banach-center/conferences/23-graphalgebras>

## Masterclass: Dilation and Classification in Operator Algebra Theory

UCPH, Copenhagen, Denmark

PARTICIPANT

Oct. 17th, 2022 - Oct. 21st, 2022

- Organizers: Adam Dor-On and Søren Eilers
- Invited lecturers: Orr Shalit, Xin Li and Mark Tomforde
- Covered topics: Dilation Theory and Applications, Operator algebras and groupoids arising from left regular representations, and An introduction to graph  $C^*$ -algebras and Cuntz-Pimsner algebras
- Link: <https://www.math.ku.dk/english/calendar/events/dilation-classification-oat/>

## Project outside the Course Scope on Groups, Operator Algebras and Dynamics

UCPH, Copenhagen, Denmark

MAIN PARTICIPANT

Sep. 2022 - Nov. 2022

- Instructor: Prof. Mikael Rørdam
- Covered topics: Amenability of Groups,  $C^*$ -algebras arising from groups, Nuclearity and Exactness of  $C^*$ -algebras as well as important results such as Stinespring's theorem, Tomiyama's theorem and Arveson Extension theorem.
- Reference Book: Brown, N.P. and Ozawa, N. (2008)  $C^*$ -algebras and finite-dimensional approximations. Providence, RI: American Mathematical Society.

## Operator Algebras, Dynamics and Groups - an ICM Satellite Conference

UCPH, Copenhagen, Denmark

PARTICIPANT

Jul. 1st, 2022 - Jul. 4th, 2022

- Organizers: Mikael Rørdam, Søren Eilers, Magdalena Musat, Asger Törnquist
- Covered topics: <http://web.math.ku.dk/~rordam/OADG-2022/titles-abstracts.pdf>
- Link: <https://www.math.ku.dk/english/calendar/events/oadg2022/>

## Student Seminar on Harmonic Analysis

SUSTech, Shenzhen China

MAIN SPEAKER AND PARTICIPANT

Sep. 2020 - May. 2021

- Instructor: Prof. Bochen Liu
- Frequency: three hours a week
- Covered Topics: Measure Theory, Fourier Transform, Uncertainty Principle, Stationary Phase Method, the Restriction Problem, and the Kakeya Problem.
- Reference Book: Wolff, T.H., Laba, I. and Shubin, C. (2003) Lectures on harmonic analysis. Providence, RI: American Mathematical Society.

## Project outside the Major: Digital Circuits Designing Project

SUSTech, Shenzhen, China

MAIN PARTICIPANT

Nov. 2017 - Jan. 2018

- Instructor: Dr. Lijun Zhang
- Contents: Using the knowledge of digital circuits and mechanical engineering to design a writing robot and using computer programming to instruct the writing robot to write characters and draw pictures.
- Tools: 3D printing, Arduino Uno and Inkscape

## Interests in Mathematics

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Operator algebras, Hilbert spaces, harmonic analysis and related topics such as category theory and quantum information. Specifically, graph and groupoid  $C^*$ -algebras, and classification program of  $C^*$ -algebras, etc..

I am also ready to know about topics from many other fields if time permits. Recently, I am learning some magnitude and its homology theory.

## Honors

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2020 **Third Award**, Outstanding Student Scholarship

SUSTech, Shenzhen,  
China

2016 **Third Award**, Outstanding Freshmen Scholarship

SUSTech, Shenzhen,  
China

## Skills, Hobbies and Specialities

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**Programming** LaTeX, MATLAB (Basic), Python (Basic).  
**Languages** English (B2-C1), Chinese (Native Speaker).  
**Musical Instruments** Chinese Erhu (Amateur Grade 10 (Highest)), Pianoforte (Basic)  
**Concerts** Chief Erhu player in 2017 and 2018 Zhiren Chinese Traditional Orchestra Special Concerts at SUSTech