

# Liang Wang

Email : WangLiang-021@sjtu.edu.cn  
Research: SYK Holography Cosmology SUSY  
Webpage: <https://leonard-wang-673.github.io/>

## 1 Education

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Shanghai Jiao Tong University 2021.09 - 2025.06

Bachelor of Science (Physics, Tsung-Dao Lee Honor Class)

**Grades:** 86/100

**Grad Courses:** Group Theory(86) Gauge Field Theory(Audit) QFT(93) GR(93)

University of New South Wales 2023.09 - 2023.12

Exchange(Physics)

**Grades:** 87/100

**Courses:** Particle Physics(96) TOR Research(91)

Université Paris-Saclay 2025.09 - 2026.06

Master (Complex systems M2) *expected*

## 2 Academics Experience

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### Workshops & Advanced Summer Schools

- 3rd and 4th Southeast University Frontier Summer School on String Theory, Field Theory, and Holography.
- Soochow University's 2nd SUIAS workshop on High Energy Physics, covering topics such as Gravitational Waves, String Theory, and Quantum Field Theory.
  - Joint TDLI and INPAC summer school in particle physics.
  - Workshop on Muon Physics at the Intensity and Precision Frontiers
  - SUT-PSI School of Muon and Neutron Physics

## 3 Research Experience

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**(gr-qc) Inflation and Early Universe** 2023.09 - 2024.06

Under the guidance of *Prof. Yvonne Wong* (The University of New South Wales), I studied cosmology and mainly focusing on early universe fluctuations and their connection to the CMB temperature.

Under the guidance of *Prof. HongJian He* (Shanghai Jiao Tong University), I researched and studied cosmological perturbation theory and basics on cosmological collider properties.

**(hep-th) Holography**

1. Duality between photon ring and black hole 2024.04 - 2024.06

I investigated the duality between the photon ring and the Quasi Normal Modes(QNMs) of Schwarzschild-like black holes with *Prof. Tower Wang*(East China Normal University). It is known that a set of canonical variables for the photon ring possesses  $SL(2, R)$  symmetry that QNMs also have. We attempted to extend this duality to astrophysical black holes. Though we only have a trivial extension.

## 2. Summer research study on $AdS_5/CFT_4$

2024.06 - 2024.07

In FuSEP summer research program at the University of Science and Technology of China, I studied the building of  $AdS/CFT$  under *Jianxin Lu*'s supervision. I presented a reading report on how to build the correspondence between  $AdS_5 \times S^5/CFT_4$  through  $D_3$  Branes on the action level.

## 3. SYK, Wormhole and Teleportation

2024.11 - 2025.05

Under *Prof Antonio Garcia*'s supervision (SJTU), I learned in depth the properties of the SYK model, JT/SYK duality, and the Maldacena-Qi model(which has wormhole interpretation). I further explored the Keldysh dynamics of the open system SYK and looked into how measurements in the SYK model can be interpreted within its dual gravitational system.

## 4. $N=(0,2)$ Super-Symmetric SYK and higher spin

2024.12 - Now

Given  $N=(0,2)$  Super-Symmetric SYK-like model, with  $\mu$  as a parameter indicating the number ratio of chiral and fermionic super-fields, it demonstrates higher spin properties in specific  $\mu$ . I am supervised by *Prof Cheng Peng*(KITS-UCAS) and we are currently studying whether this is a general feature in different models. Currently we are focusing on the model with a specific E-term.

## (Others) Other Research

### Research on Muon Source feasibility

2023.01 - 2024.02

Working in *Prof. Kim Siang Khaw*'s group in Tsung-Dao Lee Institute, we used GEANT4-based simulation software to simulate particle interaction processes, and optimize the target to maximize muon production rate. Our group's work is demonstrated as follows.

Preprint: *Simulation studies of a high-repetition-rate electron-driven surface muon beamline at SHINE* arXiv:2503.01597

## 4 Skills

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- Language & Coding:

Tofel(105/120),Python, C++, Linux, Matlab, Mathematica, L<sup>A</sup>T<sub>E</sub>X, HTML

- Program:

CAMB(Cosmology) MESA (Astro) ROOT, Geant4, Paraview(hep-ex) OpenVINO ( Machine Learning and Computer-Vision), Origin(Data Processing).