

# Zongqi Shen

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## Education Background

### Department of Physics, Fudan University

Shanghai, China

Bachelor of Science in Physics

Sep.2018-Present

- Overall GPA: **3.8/4**, Rank: top 5% in the department of physics
- Graduate Course: Advanced QM, Many-body Physics, Solid State Theory, Superconductivity
- Standard Tests: TOEFL 106 (Speaking 24)
- National Scholarship 2020 (highest honor for undergraduates)

## Research Interest

### Combine experiment with theory to explore exotic quantum materials and emergent phases

- Interplay among spin, orbital, charge and lattice especially on the interface
- Unconventional superconductors and topological superconductivity
- Majorana zero mode and its potential application to quantum computing
- Transport properties of nanoscale systems

## Research Experience

### Research on time-reversal symmetry breaking in superconductors

Sep.2020-Dec.2020

Supervised by Prof. [Wei Li](#), Fudan University

- Gained rich experience in combining experiments with theories to better understand condensed matter physics
- Used group theory to analyze the pairing symmetry in our sample and help explain the coexistence of ferromagnetism and superconductivity
- Proposed a topological origin of the four-fold symmetry in transverse resistance, which provided a new explanation of the two-fold symmetry in previous work *Nature* 547, 432–435 (2017)
- Our new discovery of time-reversal and rotational symmetries breaking in superconductor has been submitted to *Nature*

### Research on fingerprints of Majorana zero mode in topological superconductors

June.2019-Present

Supervised by Prof. [Wei Li](#), Fudan University

- Received systematic training in the theory of superconductivity
- Used nonequilibrium Green's function method (NEGF) and analytical methods to calculate the transport properties of p+ip and d+id superconductors
- Proposed that transport measurements can be utilized to identify the existence of Majorana zero mode in p+ip and d+id superconductors
- A paper based on the work is in preparation

### Research on 2D materials and device fabrication

Nov.2018-June.2019

Supervised by Prof. [Faxian Xiu](#), Fudan University and State Key Laboratory of Surface Physics

- Synthesized high quality  $\text{Bi}_2\text{Se}_3$  sample using chemical vapor deposition method (CVD)
- Peeled off single-layered graphene for heterostructure fabrication
- Helped establish a platform for stacking layers of 2D materials controlled by LabView
- Received technical training in device fabrication and transport measurement

## Publication

1. Tianzhong Yuan\*, Da Jiang\*, Huanyi Xue\*, **Zongqi Shen**, Lijie Wang, Muyuan Zou, Junwei Ma, Guanqun Zhang, Gang Mu, Wei Peng, Xinyuan Wei, Shiwei Wu, Zhenghua An, Yan Chen and Wei Li<sup>†</sup> “**Time-reversal and rotational symmetries breaking in a spinel superconductor**” submitted to *Nature*

## Skills

### Computational:

- Programming: python, C, Mathematica
- Simulation: Kwant, Comsol
- LaTeX

### Laboratory:

- Material growth and nanofabrication
- Ultra-high vacuum equipment operation
- LabView programming
- Transport measurement at low temperature