CURRICULUM VITAE: **ZHUGUANG CHEN**

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EDUCATION

M. Sc. Zhejiang University   09/2020-09/2024 (Expected)
Major: Theoretical Physics   Hangzhou, China
Grade: 85.5/100
The first semester: Advanced Quantum Mechanics (76 points), Solid State Theory I (79 points)
The second semester: Advanced Statistical Mechanics (85 points), Solid State Theory II (100 points)
Audit courses: Functional Analysis, Differential Geometry

B. E. Guangdong University of Technology   09/2016-06/2020
Major: Energy and Power Engineering   Guangzhou, China
Grade: 90.8/100 (Over all GPA: 4.01/5.00)   Rank: **2/187**
Foundational courses: Advanced Mathematics I&II (96, 98 points), Linear algebra (95 points), Probability (97 points), Complex Function and Integral Transformation (93 points), College Physics I&II (96, 99 points), Theoretical Mechanics (98 points), Electrician and Electronic Technology (100 points)

RESEARCH INTERESTS

- Novel topological phases in quasicrystals
- Superconductivity in moiré quasicrystals
- Many-body localization and quantum chaos
- Topological phases out of equilibrium

SELECTED PAPERS

- **Fractal Surface States in Three-Dimensional Topological Quasicrystals**
Z.G. Chen, C.Z. Lou, K. Hu* and L.-K. Lim[†] (arXiv:2401.11497)

- **Non-precious catalysts for hydrolysis of $NaBH_4$ as a hydrogen generation for PEMFC system: a review on cyclic ability & deactivation mechanism & reactivation strategy**
Z.G. Chen, B.T. Chen, W.T. Cai*, J. Cui*, X.S Yang, Y.Z. Yang, H. Wang

- **A seawater hydrogen production reactor and method.** 202010543639.X;111807321B,
Z.G. Chen, J.C. Xu, H. Lan, K.T. Huang and Y. X. Hu **(Grant of an invention patent)**

RESEARCH EXPERIENCES

Electronic states of topological quasicrystals in three dimensions   09/2020-11/2023
Lead to a publication (see above)   *Supervisors*: Prof. Lih-King Lim & Prof. Kaige Hu

- Constructed **quasicrystals** based on cut-and-project method, self-similar transformation
- Explored Electronic states in quasicrystals based on different tight-binding models, including vertex model, center model and near-neighborhoods models
- Classified topological crystalline phases in momentum space by calculating Wilson loop and Pfaffian
- Identified three-dimensional fragile quasicrystals by applying **twisted bulk-boundary principle**
- Calculated **topological invariants in real space** from noncommutative geometry angle, including Bott index, spin Bott index and mirror Bott index
- Explored topological invariants in real space based on K theory, including Kitaev formula and local Z_2 and tried to generalized them to measure topological crystalline phase
- Captured the topological properties in real space by three-dimensional local chiral/Chern-Simon marker
- Identified **fractal dimensions** of the topological surface states and bulk states in quasicrystals
- Evaluated the transport properties of Ammann-Beenker tiling based on non-equilibrium Green function
- Achieved 'gap labelling' and energy landscapes for Ammann-Beenker tiling

Two-dimensional quantum spin Hall effect in quasicrystals   10/2018-09/2020
National Undergraduate Innovation Program, Leader   *Supervisor*: Prof. Kaige Hu

- Constructed quasicrystals based on dual grid method and preformed periodic approximation
- Learned basic topological models and second quantization form
- Calculated and compared the energy spectrum in real space under different boundary conditions
- Explored edge states and bulk states under open boundary condition

Study on the performance of thermal management system for water spray evaporation coupling forced air-cooling battery *Bachelor Thesis*	09/2019-06/2020 *Supervisor*: Prof. Yanxin Hu

- Designed a forced-air cooling power battery thermal management system
- Performed an experiment to identify the charged or discharged at different rates
- Analyzed the effect of discharge rate, spray power and wind speed

Cyclic ability of non-precious catalysts for hydrolysis of NaBH₄ *National Undergraduate Innovation Program, Lead to a publication (see above)*	10/2017-10/2020 *Supervisor:* Prof. Wei-tong Cai

- Reviewed hundreds of kinds compounds and compared their cyclic stability
- Summarized the deactivation mechanism of the non-precious catalysts
- Searched and summarized several methods to conquer to deactivation after cycling
- Suggested several possible ways to better the cyclic stability of non-precious catalysts
- Wrote a long review on deactivation mechanism and corresponding methods

Minimax problems in Banach space *Undergraduate Innovation Training Program, Leader*	07/2017-07/2018 *Supervisor:* Prof. Yuqing Chen

- Learned the basic concepts and properties of normed linear space, Banach space and topological space
- Studied the Minimax theorem in Euclidean space and normed linear space
- Tried to generalize the Minimax theorem in normed linear space to Banach space

ACADEMIC COMPETITIONS

- Finalist Winner in Mathematical Contest in Modeling (**Leader of 3-person team**, **Top 2%**) — 04/2020
We wrote the paper "*How to construct a durable sandcastle foundation?*", established a model based on the principle of mechanics to find the most durable shape of sandcastle. Creatively, we designed an experiment to verified our theoretical conclusion only by using sands and shower jet.
- The Second Prize in Chinese Mathematics Modelling Competitions — 09/2018
- Special Prize of Mathematics Modeling Competition of Guangdong University of Technology (**Rank 1**) — 05/2018
- The First Prize in Chinese Mathematics Competitions (**Top 5%**) — 10/2017

SCHOLARSHIP

- The Second Prize Scholarship ($1,357) — 11/2023
- Innovation Scholarship for Competitions ($1,724) — 04/2020
- National Scholarship (**National Top 2%, Rank 2/785**) ($1,150) — 2017 & 2018
- The First Prize Scholarship — 2017 & 2018
- Academic Scholarship — 10/2017
- Innovation Scholarship — 10/2017

SERVICES & ACTIVITIES

Teaching experiences
Teaching Assistant, General Physics I (*Honors*), Spring/Summer 2022, Zhejiang University
Teaching Assistant, General Physics II (*Honors*), Fall/Winter 2022, Zhejiang University
Teaching Assistant, Experiment of College Physics, Fall/Winter 2021, Zhejiang University
Academic activities
Sino-German Workshop on Topology Dynamics and Quantum Information (*Poster*) — 05/2023
The 2nd Symposium on Fractional Quantum Hall Effects (FQHE II) (*Poster*) — 05/2023
The 17th National Symposium on Low Temperature Physics — 06/2021

LEADERSHIP & SKILL

Leadership: Leader and Promoter of Academic Elite Club in GDUT (consists of the first place in each college)
Skill: Skilled at MATLAB, Python, Mathematica, LaTeX, EndNote, MS Office, 3D Max