

CURRICULUM VITAE: ZHUGUANG CHEN

Tel: (+86) 189-2350-1292; Email: zhuguang@zju.edu.cn
Date of birth: 1997.12.21; Nationality: China

EDUCATION

M. Sc. Zhejiang University 09/2020-09/2023 (Expected)
Major: Theoretical Physics Hangzhou, China

Grade: 85.6/100 (Over all GPA: 3.67/4.00)

Major courses: Advanced Quantum Mechanics, Advanced Statistical Mechanics, Solid State Theory I & II

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**

Fundamental 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

- Exotic topological phases in quasicrystals
- Classification of topological phases in quasicrystals
- Many-body quantum chaos and random matrix theory
- Dynamics and thermalization in quantum many-body systems

PUBLICATIONS

- **“Fractal Topological Surface States Induced by Quasicrystals in Three Dimensions”**
Z.G. Chen, C.Z. Lou, K. Hu* and L.-K. Lim[†] (to appear in arXiv and submit to *PRL* soon)
- **“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 (to submit to *JMCA*)
- **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 09/2020-11/2022
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
- Found the patch-dependent electronic states in Ammann-Beenker tiling
- Identified multifractality of critical behavior of electronic
- Analyzed the point-group symmetry of the quasicrystals
- Calculated topological invariants in momentum space, including Wilson loop and Pfaffian
- Built the low-energy effective Hamiltonian based on the symmetry of the system
- 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 \mathbb{Z}_2 and applied them to topological crystalline insulators
- Captured the topological properties in real space by local Chern marker and local \mathbb{Z}_2 marker
- Studied Berry curvature in topological crystalline insulators and high-order topological insulators and tried to define rotation Bott index
- Learned how to calculate the transport based on non-equilibrium Green function (NEGF)

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 did periodic approximation
- Learned basic topological models with 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

09/2019-06/2020

Bachelor Thesis

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 NaBH_4

10/2017-10/2020

National Undergraduate Innovation Program, Lead to a publication (see above) *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

07/2017-07/2018

Undergraduate Innovation Training Program, Leader

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.
- Second prize in Chinese Mathematics Modelling Competitions 09/2018
- Special Prize of Mathematics Modeling Competition of Guangdong University of Technology (**Rank 1**) 05/2018
- First prize in Chinese Mathematics Competitions (**Top 5%**) 10/2017

SCHOLARSHIP

- Innovation Scholarship for competitions (\$1724.39) 04/2020
- National Scholarship (**National Top 2%, Rank 2/785**) (\$1149.59) 2017 & 2018
- The First Prize Scholarship 2017 & 2018
- Scholarship for excellence in study 10/2017
- Innovation Scholarship 10/2017

SERVICES & ACTIVITIES

Teaching experiences

Teaching Assistant, General Physics I (*Honors*), Spring/Summer 2022, Zhejiang University
Classical Mechanics, Thermal and Statistical Mechanics

Teaching Assistant, General Physics II (*Honors*), Fall/Winter 2022, Zhejiang University
Electricity and Magnetism, Optics and Quantum Mechanics

Academic activities

Workshop on Quantum Materials for Modern Magnetism & Spintronics 07/2021
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