# Changkai Zhang

*Curriculum Vitae*

## Education History

2019 – 2021 **Master of Science**, *Ludwig-Maximilian-Universität München*, München.
Specialized in Theoretical Physics. Grading – 1.7/1.0

2016 – 2018 **Bachelor of Science**, *The University of Manchester*, Manchester.
Specialized in Theoretical Physics. Grading – First Class Honours.

2015 – 2018 **Bachelor of Science**, *Beijing Normal University*, Beijing.
Specialized in Physics. Grading – 87/100

2014 – 2015 **Bachelor of Science**, *Beijing Normal University*, Beijing.
Specialized in Computer Science.

## Master Thesis

Title **Symmetric iPEPS Study of Quantum Lattice Models**

Supervisor Prof. Jan von Delft

Description Infinite Projected Entangled-Pair State (iPEPS) is a type of tensor network state ansatz for two-dimensional quantum lattice models. Symmetries can be exploited to reduce numerical costs and study quantum states with distinct symmetries. Remarkably, our calculations show that an $\mathrm{SU}(2)$ symmetric uniform state of the $t_1$-$t_2$ Hubbard model is lower in energy than the previously found $\mathrm{U}(1)$ stripes.

## Bachelor Thesis

Title **On the AdS/CFT Correspondence**

Supervisor Prof. Niels Walet

Description This thesis is a brief review of the AdS/CFT correspondence, including the original derivation and a modern implication of the AdS/CFT correspondence with a revealing introduction of the concepts used. Also presented are checks of this correspondence and how it can be applied in areas like computing the entanglement entropy.

## Teaching Experience

2019 **Lecture Series on Gauge/Gravity Duality**.
Lecture series given at Sustech including 4 lectures on some basic string theory and the gauge/gravity duality as well as its applications on holographic entanglement entropy and holographic superconductors.

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## Research Experience

2020 – 2021 **Tensor Network Study of Quantum Lattice Models**.
One-year master's project on symmetric iPEPS study of various two-dimensional quantum lattice models on square lattices, especially $t_1$-$t_2$ Hubbard model.

2016 – 2017 **Path Integral Quantization of Fields**.
One-year undergraduate research training program. Leader of a team of 3 members. Document is hosted by Readthedocs, accessible via path-integral-project.rtfd.io

## Coursework

2016 **Measurement of Compton Cross Section**.
Lab report on the measurement of the differential cross section of Compton scattering, available via DOI: 10.13140/RG.2.2.30861.23526

2018 **Nuclear and Particle Physics**.
Lecture note on PHYS30121 Introduction to Nuclear and Particle Physics at the University of Manchester, available via https://chx-zh.cc/NucParPhys-Online

## Computer Skills

Language C/C++, Python, Haskell, Mathematica, LaTeX

Utilities Linux & CLI tools, Vector Graphics e.g. Illustrator & Gravit Designer

Algorithm Machine Learning, Deep Learning

## Languages

Chinese First language, simplified & traditional

English Second language, oral & written, daily & academic

Deutsch Third language, beginner's level, oral & daily

## Interests & Hobbies

Aviation All sorts of model aircraft, including fixed-wing aircraft, helicopters and rockets. Also interested in commercial flight safety.

Network A web server hosted by a Raspberry Pi and several cloud computing instances running various web services.

Music & Art Chinese traditional-style music & traditional instruments. Graphic design and web front-end interface design.

PKM System Personal Knowledge Management, the methodology of managing computerized knowledge and creating efficient human-computer interaction.

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