浙江大学长聘教授（副教授）申报表

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所在一级学科：	物理学
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填报日期：　　年　月　日

一、简况

姓名	LIM LIH KING	性别	男	出生年月	1980 年 04 月	国籍	马来西亚
现党政职务				现工作单位		物理学院	
现聘岗位类别	百人计划研究员(自然科学 B 类)			聘任期限		自 2018-01-01 至 2023-12-31	

所在一级学科	物理学
所在二级学科	凝聚态理论
从事专业及专长	凝聚态理论
最后学历、毕业学校、所学专业、学位及取得时间、导师姓名	博士研究生毕业 、乌德勒支大学、理论物理、理学博士、2010-01、Prof. Cristiane Morais Smith

主要学术兼职	（兼任专业学会、协会职务、专业期刊编委等，请注名起讫年月） 无。

个人简历（从大学开始，采用时间倒序方式填写，时间不间断）

学习进修经历	自何年月至何年月，在何地、何学校（何单位），何专业，学习、进修，导师 1.2006-01 至 2010-01, 乌德勒支大学, 理论物理, 博士研究生毕业, Prof. Cristiane Morais Smith 2.2004-02 至 2005-09, 乌德勒支大学, 理论物理, 硕士研究生毕业, Prof. G. 't Hooft (1999 Nobel Physics Prize) 3.2002-09 至 2003-07, 剑桥大学, 理论物理, 硕士研究生毕业, Prof. Nick Menton 4.1999-09 至 2002-07, 帝国理工, 物理, 大学毕业, Prof. Vlatko Vedral
工作经历	自何年月至何年月，在何地、何学校（系所）、何单位任职，任何职（海外职位英文表述） 1.2018-01 至今，中国，浙江大学，百人计划研究员 2. 2015-11 至 2017-12, 中国, 清华大学, 副研究员 3. 2014-10 至 2015-09, 德国, 马克斯普朗克复杂系统物理研究所, 博士后 4. 2010-10 至 2014-09, 法国, 巴黎十一大学, 博士后 5. 2010-02 至 2010-09, 荷兰, 乌德勒支大学, 博士后 学习、工作经历如果不连续请说明原因：

二、立德树人成效概述

2.1 在课程教学、科学研究、指导学生、参与学生社会实践和社团活动、担任班主任、德育导师、新生之友、招生就业等方面落实立德树人根本任务的情况和成效。

Interaction of students and professors in university environment is the bedrock of civilized society. During the teaching of undergraduate students, I always foster open discussions, active thinking in academic learning. Students from CKC College (竺可桢学院) possess high inquisitive quality that they always approach me to ask questions after the General Physics courses. With other instructors of General Physics I and General Physics II, we hold office hours during the semester to give students the extra opportunities to interact with us. We also give mock exams to better prepare them for the final exam.

As for my graduate students, I always encourage them to ask questions during the lectures. As the course I taught is mainly theoretical, it is important to make a lot of exercises to learn the subject. I therefore put emphasis on doing exercises, writing clear lecture notes on the blackboard, as well as giving them workclass sessions to demonstrate them how to approach what seemed mathematically complex problems with physical understanding.

For graduate students in my group, we hold reading club, journal club, following online seminars as well as regular discussions. In the reading club, we go through some popular science articles, for example Physics Today magazines, with the purpose of teaching them how to read and write scientifically. In the journal club, we read mostly some classic papers in the field and have discussions together. This is to make sure we learn the subject together, giving them an opportunity to learn to express themselves clearly. During the pandemic, there are few schools and conferences, and therefore I switched to following online seminars. Roughly about once a month, we would meet to watch a recorded seminar on subjects that are of interests.

Outside research time, we occasionally go for meals together and have discussions about encouraging them to do more sports and develop good work and rest habits, to improve efficacy of learning.

My first PhD student, Cunzhong Lou, received an offer of post-doctoral position from ITP, Beijing. He is expected to defend his PhD in summer 2024. The second PhD student, Zhuguang Chen, have a manuscript in the final stage of writing, and there is a new project he is already in charge. In one year time from now, his PhD research is going as planned.

2.2 近 3 年学校年度考核情况

2020 优秀 2021 合格 2022 合格

三、人才培养、教育教学工作概述

3.1 教育理念，本科教育教学、研究生教育教学等情况和成效

For the undergraduate General Physics courses, they are thought in English to fulfil the internationalization teaching at Zhejiang University. The students of CKC College (竺可桢学院) are the best selected students from a broad majors fulfilling the honours class requirement, and are always seeking extra challenges. Moreover, the

course offers them a first-hand (and sometimes the only) experience in their undergraduate studies a fully English taught lecture. To fulfil the high teaching standard, I have integrated many materials from Feynman's Lectures of Physics (the "gold standard" for Physics major students) into both GPI and GPII, setting a high standard for non-physics major (for e.g., medical, informatics, mathematics, mixed major) students in my classes.

In 2021 a new call for high quality teaching at CKC College transformed teaching into smaller classes thus requiring extra instructor for GP II. I took the responsibility to switch from GP I to GP II, therefore expanding my teaching profile with two General Physics courses in the course of four years. I am also glad that our undergraduate courses of GPI and GPII, in co-operation with a team of excellent instructors, were awarded 2020 Provincial Excellent Teaching course (2020 年度省级线下一流课程).

As new faculty, developing topical frontiers course is important both for the graduate students and the instructor. Without the requirement of teaching duty, I gave 16 hrs of Non-equilibrium Stat Phys graduate course during my first year. In the course, I exposed the students to advanced theoretical techniques in integrable spin chains and many-body entanglement. The course provided graduate students from both Zhejiang University and Westlake University, and through feedbacks from Prof Xin Wan (within the same department) and Prof Wei Zhu (Westlake university), my course has been useful for their new graduate students in developing research topics later.

I took charge of the Solid State Phys II graduate course from Prof. Stefan Kirchner (previous instructor) during the last two years. I follow the course material from the prestigious Paris-Region-Master-course in Condensed Matter Physics delivered by Prof. Benoit Doucot. The course, which for e.g., covers many-body screening, Anderson model of magnetism, served as a full theoretical course in strongly correlated physics in the department. Students from the experimental strongly correlated system group, as well as numerical students from the Chemistry department have attended my course and has received continuous positive comments directly from them, with 99.9% attendance rate throughout the semester. The course evaluation are consistently rated 5.0 points.

3.2 承担教学及人才培养情况

1.开设课程情况

授课名称	授课时间	授课对象	讲授课时数	授课人数	评估结果

1. 普通物理学Ⅰ（H）, 2018-2019 春夏, 本科生,16 学时,≈50 人,优秀
2. 普通物理学Ⅰ（H）, 2018-2019 春夏, 本科生,16 学时,≈50 人,优秀
3. 普通物理学Ⅰ（H）, 2019-2020 春夏, 本科生,64 学时,44 人,优秀
4. 普通物理学Ⅰ（H）, 2020-2021 春夏, 本科生,64 学时,66 人,21-60%
5. 普通物理学 II（H）, 2021-2022 秋冬, 本科生,16 学时,≈50 人,未参评
6. 普通物理学 II（H）, 2021-2022 秋冬, 本科生,16 学时,≈50 人,未参评
7. 普通物理学 II（H）, 2022-2023 秋冬, 本科生,32 学时,80 人,21%-60%
8. 普通物理学 II（H）, 2022-2023 秋冬, 本科生,32 学时,56 人,61%-90%
9. 普通物理学 II（H）, 2023-2024 秋冬, 本科生,32 学时,≈60 人,课程进行中
10. 普通物理学 II（H）, 2023-2024 秋冬, 本科生,32 学时,≈60 人,课程进行中
11. 非平衡物理, 2018-2019 秋冬, 研究生, 16 学时,15 人,5.0
12. 固体物理 II, 2021-2022 春夏, 研究生, 32 学时,14 人,4.9
13. 固体物理 II, 2022-2023 春夏, 研究生, 32 学时,24 人,5.0

2. 指导本科生毕业论文（设计）情况

姓名	专业	年级	在候选人指导下获得的奖励
1.--, --, --, --			

3.指导研究生情况

姓名	研究生类型	专业	年级	在候选人指导下获得的奖励
1.陈柱光, 博士研究生, 物理学, 2020, 2.娄存忠, 博士研究生, 物理学, 2020, 3.娄存忠, 硕士研究生, 理论物理, 2018,				

4.教学学术情况

（包括国家规划教材编写、教学成果奖励、课程建设等方面的情况。有合作情形的，请注明个人贡献）

四、主要学术成就（含学术研究概述、代表性成果与贡献点，总体不超过 2000 字）

学术研究概述

（包括学术研究方向、创新点、贡献及代表性成果，不超过 500 字）

Major Research Accomplishments

We perform theoretical investigations of complex condensed matter phenomena. We make close contacts with the most recent experimental developments in particular in quantum simulation platforms such as cold atoms, trapped ions and condensed matter materials. The two research achievements are in the fields of topological physics and out-of-equilibrium physics. In cold atoms, our work on quantum phase transition for bosons in the presence of artificial flux continues to attract experimentalists interests.

代表性成果及贡献点

(1) Topological physics: Maximal anomalous Hall effect

Topological objects continue to attract interests of condensed matter physics, because of its intriguing mathematical structure and potential quantum technology applications. One contribution we made is to provide an elegant model of vortex line in topological systems. The structure is the momentum space analogue of the famous smoke ring structure of Lord Kelvin, when he envisaged extended topological structures in classical fluids. The work has been published in PRL 2017 with Prof. R. Moessner, director of PKS Max Planck Institute, Dresden, Germany, with 58 citations (Google scholar), myself as the first author. Our work led to a novel topological nodal line system with a maximal three-dimensional anomalous Hall effect, with recent preliminary experimental signature (see below).

Winding vector structure: A most intriguing phenomenon we discovered is the merging of momentum-space topological objects in graphene-like system that evades the conservation rule of topology (with collaborators from LPS CNRS, France). We unveil a hidden *winding vector* structure that resolves the apparent physical paradox, thus leading to a complete description of point-like topological defects in two-band systems. Our work was published in PRL in Dec 2018, with myself as the corresponding author, with 34 citations.

Preliminary experimental signatures: By combining the two work, the concept of winding vector finds wider realization in nodal line systems. Together with Prof. R. Moessner (director of PKS Max Planck Institute, Dresden, Germany) and Prof. G. Sangiovanni (Wurzburg, Germany), we are currently working on a project in collaboration with the experimental group led by Prof. H. Bentmann (Wurzburg, Germany) using soft-X-ray-ARPRES in DESY, Hamburg, Germany, to tomographically image the momentum-space vortex line. We are hopeful that the work will be finished by the end of the year, and is planned for submission to high-impact magazine.

Topological physics in cold atoms: We work on Floquet systems to generate artificial gauge fields and studied the Bose-Hubbard model in the presence of a staggered flux (PRL 2008, 175 citations), later realized in experiments in the group of Prof. Immanuel Bloch (director, Quantum Optics Max Planck Institute, Garching, Germany). We also give a full theory (PRL 2012, 149 citations) for an experiment with Dirac points merging in the group of Prof. Tilman Esslinger (Nature 2012, ETH, Zurich).

(2) Out-of-equilibrium dynamics: A major effort in quantum statistical mechanics and quantum simulations is addressing out-of-equilibrium physics in an isolated quantum system. The field is actively pursued because of experimental advances in quantum simulation platforms. The ability to prepare the initial state, the monitoring of time evolution and realization of different kinds of measurement, have totally transformed the way we approach the subject of out-of-equilibrium physics.

Disordered quantum gases: This is a collaboration with the experimental group led by Prof. A. Aspect (2022 Nobel Physics Prize laureate) and Prof. V. Josse (Palaiseau, France). We studied the elastic scattering time of cold atoms in two-dimensional optical speckle potentials. Disordered physics in two dimensions has always been a long challenging issue for it is intermediate between one and three dimension where the effects of disorder on transports is better understood. For the first time we can monitor various two-dimensional scattering regimes ranging from Born to weak localization, quantitatively testing the famous Ioffe-Regel localization criteria (PRL 2019, 17 citations).

Quantum entanglement fluctuations: Before the advent of modern quantum simulations (pre-2010), the measurement of entanglement entropy is even doubtful - most physicists would think that it is not even a physical observable. The perspective has shifted when single-site resolution measurements (such as for e.g., using quantum gas microscopy, quantum state tomography techniques) become possible in quantum simulation platforms. In the past two years, our group has developed theoretical techniques to address the dynamics of quantum entanglement (with Prof. Chushun Tian, ITP Beijing). We study fluctuations of entanglement entropy when a system is suddenly brought out of equilibrium. We discover a universal scaling law for fluctuations in the quantum evolution of entanglement – for integrable lattice fermions, for different kinds of entanglement measures, and can be generalized to interacting systems (verified by numerical method of exact diagonalization). We provide the scaling parameters for the full distribution of entanglement fluctuations, which intriguingly shares many similarities to the universal conductance fluctuations in mesoscopic systems. We believe the universal scaling law is the first of its kind proposed in this context, which can serve as a benchmark for entanglement fluctuations studies in mesoscopic quantum simulation platforms, including trapped ions, cold atoms and superconducting qubits for quantum technologies. More generally, by studying dynamical fluctuations of entanglement, our work opens the quantum information theoretic perspectives on quantum thermalization issues, one of the most challenging problem in quantum statistical mechanics. Our work is currently under review in the journal Nature Communications.

五、科研主要情况（聘期内或近五年）

5.1 承担主要科研项目

项目名称	项目性质及来源	项目经费（括号内为本人主持经费）（单位万元）	项目起讫年月	本人排序

1.十二批国家“千人计划”青年项目, 纵向, 中央组织部人才工作局, 100(100), 2016-05-, 1/1
2.冷原子系统的纠缠熵和量子序问题, 纵向, 国家自然科学基金委员会, 59(59), 2020-01-2023-12, 1/1

5.2 获奖情况

获奖项目名称	奖励名称及等级	授奖单位	获奖年月	本人排序

5.3 获得专利情况

专利名称	专利授权国、专利号	专利类型	授权公告年月	本人排序

5.4 代表性论文、著作情况（以浙江大学为第一署名单位，否则请注明）

论文：所有作者姓名（本人名字请加粗，通讯作者名字上用*标示），论文题目，发表期刊名称，发表年月，卷，期，起止页码。（共同一作或共同通讯作者请注明个人贡献）

1. K.-H. Ding, **L.-K. Lim***, G. Su, and Z.-Y. Weng, Quantum Hall Effect in AC Driven Graphene: From Half-Integer to Integer Case, Physical Review B, 2018-01, 97, 035123,1-9， 通讯作者，本人浙大署名单位，论文非浙大第一署名单位。

2. H. Yang, R. Moessner, and **L.-K. Lim***, Quantum Oscillations in Nodal Line Systems, Physical Review B, 2018-04, 97, 165118，1-7, 通讯作者，本人浙大署名单位，论文非浙大第一署名单位。

3. G. Montambaux, **L.-K. Lim***, J.-N. Fuchs, and F. Piéchon, Winding Vector: How to Annihilate Two Dirac Points with the Same Charge, Physical Review Letters, 2018-12, 121, 256402，1-5, 通讯作者，本人浙大署名单位，论文非浙大第一署名单位。

4. J. Richard, **L.-K. Lim**, V. Denechaud, V. V. Volchkov, B. Lecoutre, M. Mukhtar, F. Jendrzejewski, A. Aspect, A. Signoles, L. Sanchez-Palencia, V. Josse, Elastic Scattering Time of Matter-Waves in Disordered Potentials, Physical Review Letters, 2019-03, 122, 100403,1-6， 其他作者，本人浙大署名单位，论文非浙大第一署名单位。

5. A. Signoles, B. Lecoutre, J. Richard, **L.-K. Lim**, V. Denechaud, V. V. Volchkov, V. Angelopoulou, F. Jendrzejewski, A. Aspect, L. Sanchez-Palencia, V. Josse, Ultracold Atoms in Disordered Potentials: Elastic Scattering Time in the Strong Scattering Regime, New Journal Physics, 2019-10, 21, 105002，1-13, 其他作者，本人浙大署名单位，论文非浙大第一署名单位。

6. K.-H. Jin, H. Huang, J.-W. Mei, Z. Liu, **L.-K. Lim**, and F. Liu, Topological Superconducting Phase in High-Tc Superconductor MgB2 with Dirac-Nodal-Line Fermions, npj Computational Materials, 2019-05, 5, 57，1-7, 其他作者，本人非浙大署名单位，论文非浙大第一署名单位。

7. **L.-K. Lim***, J.-N. Fuchs, F. Piéchon, and G. Montambaux, Dirac Points Emerging From Flat Bands in Lieb-Kagomé Lattices, Physical Review B, 2020-01, 101, 045131， 1-14, 第一作者，本人浙大署名单位，论文浙大第一署名单位。

8. G. Lyu, **L.-K. Lim**, and G. Watanabe, Floquet eigenspectra of a nonlinear two-mode system under periodic driving: The emergence of ring structures, PHYSICAL REVIEW A, 2020-05, 101, 053623， 1-9, 其他作者，本人浙大署名单位，论文浙大第一署名单位。

著作：所有作者姓名（本人名字请加粗），书名，出版地，出版社，出版年月，总字数及个人贡献数（个人贡献数标注在括号内）（字数单位：万字）

5.5 担任国际学术组织重要职务及在国际学术会议大会报告、特邀报告等情况

I am the co-organizer of an international conference “65th Birthday of Prof Gilles Montambaux: Mesoscopic Quantum Physics” June 23-24, 2022 (rescheduled from 2020), in LPS Orsay France. Prof. Gilles Montambaux is the emeritus Director of CNRS France. I represented Zhejiang University as a co-organizer, with the other co-organizers CNRS researchers from the LPS Orsay. The conference accommodated about 60 international participants.

I am the co-organizer of an international conference “Sino-German Workshop on Topology, Dynamics and Quantum Information in Condensed Matter Systems” June 5-9, 2023, in Zhejiang University, Hangzhou. The conference accommodated about 50 international participants. I am an invited speaker for 45mins in the conference.

5.6 担任国内学术组织重要职务及在国内学术会议大会报告、特邀报告等情况
Invited speaker for 第十六届全国低温物理学术讨论会, April 17-20, 2018, in Henan, Xingxiang.
六、社会服务等情况（应包括学生工作、公共事务及获得荣誉等）
七、其他能反映学术研究水平的突出业绩