Zeyu Kuang

Nanjing University
Laboratory of Micro/Nano-Photonics
School of Physics

Email: zeyu.kuang@gmail.com
zeyu.kuang@smail.nju.edu.cn
Cell: +86 18362917370
Address: Room 205
TaoYuan Building 2,
Nanjing University, Nanjing, 210093, China

Research Interests

Nano-photonics
Atomic, molecular, and optical physics
Precision measurement of fundamental physics

Education

	Institution	Grade
09.2014 – Present	Elite Program of Physics*, Nanjing University	88.4/100 (In top 17% of the physics department, out of 158 students)
07.2017 – 08.2017	Research Training Program, University of Western Australia	N/A
02.2017 – 06.2017	Exchange Program, Utrecht University	87.0/100 (In top 20% of the physics department, out of 23 students)

(*The Elite Program is an honors program composed of 30 selected students with outstanding academic performances on campus.)

Publications

Journals

- X Fang, **Z Kuang**, et al. "Examining second-harmonic generation of high-order Laguerre–Gaussian modes through a single cylindrical lens" Optics Letters. 2017 Oct 21;42(21):4387-90. [Cite: 0] (access to article).
- Y Wang, X Fang, **Z Kuang**, et al. "On-chip generation of broadband high-order Laguerre–Gaussian modes in a metasurface" Optics Letters. 2017 Jul 1;42(13):2463-6. [Cite: 1]. (access to article).

Under Review

- J Xu, Y Zhang, T Zhai, **Z Kuang**, et al. "Electrochromically-Tuned Plasmonics for Photothermal "Smart" Window" Nature Nanotechnology.
- Y Zhu, D Wei, **Z Kuang**, et al. "Broadband Variable Meta-Axicons Based on Nano-Aperture Arrays in a Metallic Film" ACS Photonics.
- M Goryachev, **Z Kuang**, et al. "Next Generation of Phonon Tests of Lorentz Invariance using Quartz BAW Resonators" IEEE transactions on ultrasonics, ferroelectrics, and frequency control.

In preparation

- S Ghosh, **Z Kuang**, A Mosk, S Faez, "Resonance elastic light scattering from single fluorophores" to be submitted.

Research Thesis

- **Z Kuang**. "Towards measuring absolute scattering cross section of nanoparticles and single molecules" (access to thesis).
  - Equivalent to bachelor thesis, finished **in 3rd year** in Utrecht University, the Netherlands.
  - Nominated as "Best bachelor thesis in Physics, Utrecht University, the Netherlands 2017".

Academic Activities

12.2017	Guangzhou, China	"Towards measuring absolute scattering cross section of nanoparticles and single molecules." **Z Kuang**. Invited Talk at 18th Fu Lan Physics Festival. (Organized by Sun Yat-sen University)
08.2016	Fudan, China	Quantum Optics and Precision Measurement - Summer School. (Organized by Fudan University)

Research Experience

07.2017-08.2017 **Frequency and Quantum Metrology Research Group**
University of Western Australia, Australia
Supervisors: Prof. Michael Tobar and Dr. Maxim Goryachev

- **Project** Testing Lorentz Invariance using Precision Frequencies
  Description: We tested the Lorentz invariance of phonon using quartz oscillators in a table-top experiment. We generate precise frequencies from two quartz oscillators on a rotational table. The signal we measured is the frequency difference between the oscillators. I analyzed the signal under the sun centered frame and reduced the dataset using demodulated least square method. The result constraints the Lorentz variance coefficient of interest to 10^{-17} - an improvement by a factor of 300.
  Achievements
  - Summary of my work: https://goo.gl/ZvWC1S.
  - Awarded first runner-up in 3-minute thesis presentation in University of Western Australia.
  - Paper submitted to *IEEE transactions on ultrasonics, ferroelectrics, and frequency control* and is under review.

02.2017-06.2017 **Debye Institute for Nanomaterials Science**
Utrecht University, the Netherlands
Supervisors: Dr. Siddharth Ghosh and Dr. Sanli Faez

- **Project** Measuring Absolute Scattering Cross Section of Nanoparticles and Single Molecules
  Description: Together with Dr. Ghosh, I proposed an experimental scheme and developed a setup for measuring the absolute scattering cross section of nanoparticles and single molecules. I experimentally obtained relative scattering cross sections of gold nanoparticles and dye molecule Rhodamine 6G. We also investigated the bleaching effect on the elastic scattering of fluorophores.
  Achievements
  - Research thesis nominated as the best bachelor thesis in physics, Utrecht University 2017 (access to thesis).
  - Best presentation of the bachelor research in Utrecht University (access to news report).
  - Paper soon submitted to optics journal.

10.2016-01.2017 **Laboratory of Micro/Nano-Photonics**
Nanjing University, China
Supervisor: Prof. Yong Zhang and Prof. Min Xiao

Project 1

- **Project** Generation and examination of High-order Laguerre–Gaussian Modes
  Description: We studied the generation of higher-order Laguerre–Gaussian (LG) mode and its non-linear behavior for practical applications. I designed a phase mask that would generate the higher-order LG mode through the surface plasmonic resonance, which is also demonstrated experimentally (Achievement 1). In pursuit of a more compact experimental setup, we demonstrated a feasible way to examine high-order LG mode through a single cylindrical lens, which I proved theoretically using Fourier optics through simulation (Achievement 2).
  Achievements
  1. One paper published in *Optics Letters* (access to article), another submitted to *ACS Photonics* and is under review.
  2. Paper published in *Optics Letters* (access to article).

Project 2

- **Project** Localized surface plasmon resonance and Surface Enhanced Raman Scattering

  Description: We demonstrate the tunable photothermal smart window in the sunlight region. The traditional cation intercalation induced visible-band optical modulation is proposed to couple with the near-infrared localized surface plasmon resonance (LSPR) extinction. I investigated the LSPR mode theoretically using FDTD software, and showed that the broadband non-radiative plasmon decay and the LSPR of Au are tuned by not only the electric field but also the WO_3 substrate.

  Achievements
  - Paper submitted to *Nature Nanotechnology* and is under review.

Skills

Lab skills

- Building a fluorimeter
- Familiar with mechanism of monochromator, optical fiber and other optical instruments
- Calibrating instruments and measure instrument response function

Computer skills

- Advanced Python programming (access to GitHub)
  - driver developing for lab instrument
  - GUI development
  - big data analysis
- MATLAB programming (access to certificates 1, 2, 3)
  - machine learning
  - parallel computing
- Simulation of electrodynamics with FDTD
- Linux, Latex

Honors and Awards

2017

- Best presentation in physics experimental competition in 18th Fu Lan Physics Festival.
- Best presentation of the bachelor research in Utrecht University, the Netherlands news report **top 2%**
- Nominated as Best bachelor thesis in Physics, Utrecht University, the Netherlands **top 8%**
- First runner-up in 3-minute thesis presentation in University of Western Australia **top 4%**
- Research Training Award in University of Western Australia

2016

- Excellent Student Scholarship in Elite Program of Physics in Nanjing University
- People's Scholarship for Science and Technology 1st Prize in Nanjing University

2015

- Quan Xing Scholarship in Nanjing University **top 10%**
- People's Scholarship for Science and Technology 2nd Prize in Nanjing University

Standardized Tests

GRE General
- Verbal 160/170 + Quantitative 170/170 + Writing 3.5/6

TOEFL iBT
- Reading 29/30 + Listening 29/30 + Speaking 23/30 + Writing 24/30 = 105/120

GRE Sub
- Physics: Scaled Score 970 (92%)