

Jinxin (Jacob) HU

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Chinese ●●●●● English ●●●●● Français ●●●●● Deutsch ●●●●●

🎓 EDUCATION

UNIVERSITY OF TORONTO (UoT)	SEPT 2024 - PRESENT
PhD Student at the ECE department	St. George Campus, Toronto, CA
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (EPFL)	AUG 2021 - JUL 2024
Master of Science in Physics, Minor in Photonics	Lausanne, CH
HARBIN INSTITUTE OF TECHNOLOGY (HIT)	AUG 2016 - JUL 2020
Bachelor of Science in Applied Physics, Optoelectronic Track	Harbin, CN

✂ SKILLS

TECHNOLOGIES: Linux, C, Python, Javascript, HTML, Git, Vim, L^AT_EX, LAPACK, Verilog HDL, C51, Arduino

SOFTWARE: MATLAB, Comsol, Origin, VPI Photonics, Multisim, Keil, Altium Designer, ZEMAX, Microsoft Office

COURSE: Core courses during my Master and Bachelor can be found [here](#).

🔬 RESEARCH INTEREST

My field of interest lies in the **photonic integrated circuits**, **nonlinear optics**, **semiconductor physics** and nanofabrication techniques. Theoretically, I am very into the **light-matter interaction** and the **nonlinear phenomenon** including super-continuum generation and nonlinear wavelength conversion in waveguide. Previously, I had experience on both the **fab-**
rication and the **characterization on III-V material semiconductor devices** including the **quantum wells**, **LEDs**,
and lasers. For PICs, I am familiar with the characterization of the **amorphous Si_3N_4 waveguides** $\chi^{(2)}$ and **ring**
resonators. Moreover, I am familiar with the mid-Infrared metasurfaces fabrication and characterization.

≡ PUBLICATIONS

- 1.Zhihao Sun, Dexin Sun, **Jinxin Hu**, Philippe Traore, Hongliang Yi, Jian Wu*. Experimental study on EHD flows of a dielectric liquid in a needle-plate configuration under DC/AC electric field, *Journal of Electrostatics*, vol.106, 2020.
- 2.Ozan Yakar, **Jinxin Hu**, Arman Ayan, Jonathan Faugier-Tovar, Pierre Chausse, Camille Petit-Etienne, Erwine Pargon, Quentin Wilmart, Camille-Sophie Brès*. Silicon-Rich Nitride Waveguides for Optically Enabled Second-Order Nonlinearities (In preparation)

📁 RESEARCH EXPERIENCE

Efficiency of InGaN/GaN quantum wells: influence of strain, indium composition, and growth conditions

Role: Master Thesis

10.2023 - 03.2024

Supervisor: Prof. Nicolas Grandjean

[LASPE](#), [EPFL](#)

- ▶ The efficiency of InGaN/GaN quantum wells (QWs) is mainly governed by the presence of point defects, the origin of which is still unknown.
- ▶ The project aims at elucidating the origin of the deep traps in QWs by varying different parameters and combining various characterization techniques like temperature and power-dependent photoluminescence and deep level spectroscopy.
- ▶ Numerical modeling on the QW energy states and determination of the energy of the traps

Seeded Second-Harmonic Generation in Silicon-rich Nitride ([link](#))

Role: Minor Project in Photonics

09.2022 - 02.2023

Supervisor: Prof. Camille-Sophie Brès

[PHOSL](#), [EPFL](#)

- ▶ First demonstration of the all-optical poling (AOP) in silicon-rich nitride waveguide and its SHG

- ▶ With a pump and its phase-locked second-harmonic to the generation of periodic photocurrent satisfying quasi-phase-matching condition leading to a second-order susceptibility inscription
- ▶ Extracted material constants of the 3 Si-rich nitride waveguides including the photoconductivity and photogalvanic coefficient and SHG conversion efficiency through the fitting of optical poling traces to governing equations
- ▶ Evaluated the limitations of conversion efficiency and comparison with stoichiometric SiN, nitride-rich SiN waveguide. Further Exploration on the theory interplay governing the efficiency of these devices

Lab-on-a-chip Biosensors Using Mid-Infrared Metasurfaces ([link](#))

Role: Semester project

02.2022 - 07.2022

Supervisor: Prof. Altug Hatice

[BIOS](#), [EPFL](#)

- ▶ Explored the feasibility of using the mid-infrared meta-surface to detect bio-molecules as a point of care (POC) device or as a mini-FTIR device
- ▶ Optical design and building up of the POC device in mid-IR range and its optimization in spectroscopy
- ▶ Metasurface design and fabrication in the cleanroom of the center of MicroNanoTechnology of EPFL
- ▶ IR spectrum extraction of thin layer material coated on metasurface through image processing and validation

Study of the Luminescence of Dye-doped Polymer Layer coated on the LiNbO₃ Surface

Role: [Bachelor Thesis](#)

11.2019 - 06.2020

Supervisor: Prof. Hua Zhao and Prof. Jingwen Zhang

[HIT](#)

- ▶ Theoretical and experimental verification with a prototype for visible light surface plasmon amplification by stimulated emission of radiation (SPASER)
- ▶ Through the bulk photovoltaic effect to control LiNbO₃ surface electric field and its binary phase grating and experimental demonstration on LiNbO₃ surface two-dimensional electron gases (2DEGs) are influenced by bulk photovoltaic effect
- ▶ Studied how the excitation of visible light surface plasmon polariton is influenced and how it can be manipulated
- ▶ Studied how the luminescence of dye-doped polymer can be influenced by surface plasmon polariton

Study of Electro-convection and Electro-thermo-convection of Dielectric Liquids

Role: Undergraduate Research Assistant

11.2017 - 06.2020

Supervisor: Prof. Jian Wu

[Advanced Thermal Systems Laboratory](#), [HIT](#)

- ▶ Built a two-dimension two-component (2D2C) particle image velocimetry (PIV) system for experiment fluid dynamics in both hardware and software perspective
- ▶ Theoretical simulation (computational fluid dynamics method) and experiment validation on the electrohydrodynamic (EHD) flow characteristics of dielectric liquids flow in a needle-plate configuration under AC/DC electric field
- ▶ Optimized the flow control and thermal management through controlling AC/DC electric field
- ▶ Some of the work has been published in the XI International Symposium on Electrohydrodynamics ([ISEHD 2019](#))

PROFESSIONAL & SOCIAL ACTIVITIES

MEMBER OF LUC BADMINTON

OCT 2022 - SEPT 2023

Player and member of the club of badminton universitaire lausannois (LUC)

OPTICAL SCIENCE INTERN

JUL 2019 - JUL 2019

Institution: Changchun Institute of Optical Precision Machinery, Chinese Academy of Science

SOCIAL PRACTICE LEADER

JUL 2017 - AUG 2017

The Belt and Road Initiative Social Practice Team, Harbin Institute of Technology

Conducted a survey on the changes and current situation of 5 provinces along the silk road in China after the new policy.

HOST

OCT 2016 - SEP 2017

Department of Host, Student Association of 201 Forum, Harbin Institute of Technology

Trained to host gala, conference, Lecture and other activities. After training, I presided over 2 conferences and 1 lecture.

SELECTED AWARDS

SCHOLARSHIP of 2019 The Hong Kong Polytechnic University international summer school

Aug 2019

PEOPLE'S SCHOLARSHIP (Top 3% in Dep. of Physics)

Jun 2019

HONORABLE MENTION of 2019 Mathematical Contest In Modeling (Top 24%)

Apr 2019

OUTSTANDING STUDENT AWARD of Harbin Institute of Technology (Top 3%)	Jan 2019
FIRST PRIZE of the 2018 China Undergraduate Mathematical Contest in Modeling in Heilongjiang Province	Dec 2018
FIRST PRIZE of the 9th China Undergraduate Physics Tournament in Heilongjiang Province	May 2018
GROUP PROJECT AWARD, 3RD PLACE for the ANU International Summer School Project	Feb 2018
EXCELLENCE PRIZE of the 1st Cup of Excellence 9 Alliance Undergraduate English Speech Competition	Dec 2017
SECOND PRIZE of the Winter Social Practice (Top 5%)	Mar 2017

🔧 EXTRACURRICULAR PROJECTS

Stereo Particle Image Velocimetry System Building and Its Image Processing

Undergraduate Research Assistant Project, HIT

03.2019 - 07.2020

Realization of a 2D3C PIV system from basic components, and based on the *OpenPIV*, programs are developed to obtain the three-component velocity field of fluids in a planar region illuminated by a light sheet laser, with a 2D3C PIV system finished in 2019 and an optimized 2D3C PIV system finished in 2020.

Optical Design and Algorithms Development for Light Field Cameras

2018 Undergraduate Training Programs for Innovation & Entrepreneurship of China

11.2018 - 11.2019

Light field camera is a new type of camera using an array of micro-lenses placed in front of an otherwise conventional image sensor to sense light field including intensity, color, and directional information. It can change focus, change perspective and fine control of field depth after shooting. This project is committed to improving the image quality and image processing speed for light field cameras via compressed sensing algorithms and optimized optical design conducted by Zemax, which indicates a possible solution for the over large data problem of light field video.

Design and Implementation of Low Power Embedded Application System

Undergraduate Semester Project

01.2018 - 05.2018

Design of a low-power embedded temperature measuring system both in hardware and software, including system design, PCB design, circuit board soldering, code implementation, system test, robustness verification, etc.

Rotor Unmanned Aerial Vehicle

Student Association Innovation Project

01.2018 - 05.2018

Based on *DJ naza* flight controller, managed to design and assemble a quad-rotor UAV and realized the function of automatic flying control by using *Paparazzi* in ground station.

Study on the Application of $\text{PrBaCo}_2\text{O}_5$ (PBCO) in Lithium-air Batteries (LABs)

Freshman Year Technology Innovation Project, HIT

10.2016 - 10.2017

LAB is a promising new type of battery and PBCO is a newly synthesized ceramic catalyst with excellent conductivity. By synthesizing PBCO powder and using optimized electrodes spraying method to prepare PBCO electrode, we successfully combined these 2 technologies together and improved the capacity of LAB 13 times higher than other LABs before 2017.

✈️ EXCHANGE EXPERIENCE

ESPCI PARIS - PSL

SEPT 2020 - JUL 2021; PARIS, FRANCE

Élève ingénieur d'ESPCI PSL in Physics, Chemistry, Biology

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THE HONG KONG POLYTECHNIC UNIVERSITY

JUL 2019 - SEPT 2019; HONG KONG

The PolyU International Summer School 2019

PEKING UNIVERSITY

JUL 2018 - AUG 2018; BEIJING, CHINA

2018 Summer School for Outstanding Undergraduates in Interdisciplinary Studies, the Academy for Advanced

Interdisciplinary Studies (AAIS)

Project Winner, 2nd Place

THE AUSTRALIAN NATIONAL UNIVERSITY

JAN 2018 - FEB 2018; CANBERRA, AUSTRALIA

Inaugural 2018 College of Engineering and Computer Science International Summer School

Project Winner, 3rd Place