

RESEARCH INTERESTS

Quantum engineering (solid-state systems for quantum sensing, computing, and communications; superconducting microwave circuits), quantum optics, and sensing technologies.

EDUCATION

National Taiwan University (NTU), Taipei, Taiwan

Sept. 2018 – June 2022

B.S. in Electrical Engineering (EE) | GPA: **4.24/4.3**, ranked **top 4% (7/196)**

– Selected courses (straight A+): Solid State Electronics, Modern Physics, Integrated Circuit Design, Optoelectronic Electromagnetics, RF Microwave Wireless Systems, Fourier Transform and Fourier Optics, Thermodynamics

JOURNAL ARTICLES

- [1] **Chou-Wei Kiang** and Jean-Fu Kiang, “Imaging on underwater moving targets with multistatic synthetic aperture sonar,” *IEEE Transactions on Geoscience and Remote Sensing*, vol. 60, Nov. 2022, Art. no. 4211218, [[pdf](#)] [[IEEE Xplore](#)].
- [2] **Chou-Wei Kiang** and Jean-Fu Kiang, “Imaging and motion parameter estimation of flying helicopter with duo airborne SARs in X-Band,” *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 15, pp. 9623-9638, Nov. 2022, [[pdf](#)] [[IEEE Xplore](#)].
- [3] **Chou-Wei Kiang** and Jean-Fu Kiang, “Quantum Sensing of Geomagnetic Fluctuations and Noise Spectroscopy with Hybrid Short Ramsey-Haar Wavelet Method and NV Ensembles,” *IEEE Transactions on Quantum Engineering*, under review, [[pdf](#)].

CONFERENCE PRESENTATION (*PRESENTER)

- [4] Ze-Wei Chen, **Chou-Wei Kiang***, Chia-Tse Tai, Hao-Chien Wang, Min-Jui Lin, Yen Chuang, and Jiun-Yun Li, “Weak antilocalization of two-dimensional hole gases in a modulation-doped GeSn/Ge heterostructure,” *2024 APS March Meeting*, Minneapolis, MN, USA, Mar. 3-8, 2024 (abstract submitted for review) (upcoming, oral), [[abstract](#)].
- [5] Yu-Jui Wu*, **Chou-Wei Kiang**, Tsung-Ying Li, Ze-Wei Chen, Min-Jui Lin, Wei-Hsiang Kao, and Jiun-Yun Li, “Conductance anomalies in nanoscale quantum point contact devices on an undoped GeSn/Ge heterostructure,” *2024 APS March Meeting*, Minneapolis, MN, USA, Mar. 3-8, 2024 (abstract submitted for review) (upcoming, oral), [[abstract](#)].

RESEARCH EXPERIENCES

Quantum Electronics Laboratory | Research Assistant

Mar. 2023 – present

Advisor: Prof. Jiun-Yun Li

Department of EE, NTU

- Hall measurement and characterization of undoped and modulation-doped GeSn/Ge heterostructures [4]
 - investigate strain and Sn effect on Rashba **spin-orbit coupling** by analyzing weak localization/anti-localization patterns
 - extract effective mass and analyze electrical, magneto-transport properties through temperature-dependent SdH oscillations
- Differential conductance measurement and characterization of GeSn/Ge **quantum point contact** (QPC) devices [5]
 - investigate nonlinear transport properties by sweeping the source-drain bias under different split-gate voltages
 - investigate physical mechanisms behind the measured $0.7, 0.5, 0.25(2e^2/h)$ zero-bias conductance anomalies
- Set up apparatus and write Matlab codes to control lock-in amplifiers and voltage sources for remote measurements

Digital Image and Signal Processing Laboratory

Sept. 2023 – present

Advisor: Prof. Jian-Jiun Ding

Department of EE, NTU

- propose **quantum sensing** of fast time-varying signals using **generalized wavelets** to modulate MW qubit control sequence
- evaluate the performance of Daubechies wavelets, symlets, and coiflets of various orders and scales in terms of SNR

Group of Electromagnetic Applications | Research Assistant

June 2020 – Sept. 2023

Advisor: Prof. Jean-Fu Kiang

Department of EE, NTU

- Simulations of **quantum sensing** using nitrogen-vacancy (NV) center ensembles [3]
 - implement inverse Haar wavelet transform for quantum sensing with short Ramsey and spin-echo MW control sequences
 - reconstruct a sub-nT arbitrary waveform with a sensitivity of $0.63 \text{ pT}/\sqrt{\text{Hz}}$, along with the spin-bath noise spectrum
- Synthetic aperture sonar (SAS) (**remote sensing & signal processing**) [1]
 - propose a multistatic SAS configuration to estimate the velocity vector of a moving submarine within an error of 3%
 - design a modified range Doppler algorithm to acquire SAS images by integrating three different time-frequency transforms
- Synthetic aperture radar (SAR) (**remote sensing & microwave radar imaging**) [2]
 - propose a two-stage template matching method to separate backscattered signals from fuselage and fast-spinning rotors
 - propose a duo airborne SAR and phase matching transform to estimate target velocity within 0.03% of error
- Modeling and simulation of optical radiation force (**optics & electromagnetics**) (Report:[[pdf](#)])
 - integrate Fourier transform for decomposing an incident Gaussian beam, Lorenz-Mie theory for computing scattered electromagnetic fields, and Maxwell stress tensor for computing the radiation force exerted on a spherical particle

HONORS & AWARDS

NTUEE graduation ceremony representative – Top 10 in the class of 2022

2018–2022

Dalongdong Baoan Temple Scholarship (5 times) – Merit-based undergraduate scholarship

2018–2022

NTU Presidential Award – Academic Excellence Award

Fall 2018

SKILLS

Physical modeling & simulations: classical simulation of quantum systems; EM, optics, and microwave systems

mK cryogenic system operations: TeslatronPT + KelvinoxJT insert, ProteoxMX (Oxford Instruments)

Transport & conductance measurements: B1500A semiconductor device analyzer (I-V measurement),

SR830, SR865A lock-in amplifiers, pre-amplifier, Basel low-noise/high-resolution DAC, superconducting magnet

Programming: Matlab, Python (QuTiP, Tensorflow), C/C++, Verilog

Other skills: L^AT_EX, Visio, Linux, Solidworks, Meshlab

Languages: English (**TOEFL: 106/120**), Mandarin Chinese

LEADERSHIP EXPERIENCES

Feb. 2016 – Jan. 2017

Vice-Chairman of Student Association, Taipei Municipal Chien-Kuo Senior High School