

# Fengyu Liu

Department of Electrical & Computer Engineering  
A. James Clark School of Engineering  
University of Maryland  
College Park, MD 20742

Website: [fengyuliu.com](http://fengyuliu.com)  
Email: [fyliu@umd.edu](mailto:fyliu@umd.edu)  
Phone: +1 (607) 218-2983  
Office: 1202B Energy Research Facility

## Education

**University of Maryland**, A. James Clark School of Engineering, College Park, MD, USA

Ph.D. in Electrical and Computer Engineering. Expected: May 2024

GPA: 4.00/4.00

**Nankai University**, School of Physics, Tianjin, P. R. China

B.S. in Physics, graduated from Poling honor program, June 2019.

GPA: 3.81/4.00 (90.56/100)

## Research Experience

**Graduate Research Assistant**, Department of Electrical and Computer Engineering & Institute for Research in Electronics and Applied Physics, University of Maryland (August 2019 – Present)

Supervisor: Prof. Yanne Chembo

- (1) Researched quantum dynamics of bi-photon generation in nonlinear cavity to manage and control the high-dimension entangled photons in quantum optical fiber networks.
- (2) Simulated the dynamics of Kerr optical frequency combs in ultra-high Q whispering-gallery-mode resonators. Studied the bifurcations between stable/unstable solutions in order to guide the design of experiments and applications.
- (3) Generated high spectral purity microwaves with Kerr optical frequency combs, analyzed the effects of quantum and semi-classical fluctuations on phase noise.

**Undergraduate Researcher**, School of Applied & Engineering Physics, Cornell University (June 2017 – Sept. 2017 & July 2018 – March 2019)

Supervisor: Prof. Gennady Shvets

- (1) Designed and modeled photonic components using photonic topological insulators.
- (2) Developed numerical simulations for calculating electromagnetic (EM) properties of Metagate-Tuned Graphene.

**Undergraduate Researcher**, School of Physics, Nankai University (May 2016 – June 2018)

Supervisor: Prof. Zhigang Chen & Prof. Daohong Song

- (1) Collaborated with experimentalists to design and simulate optical waveguides with topologically protected one-way modes.

## Journal Publications

**F. Liu**, and Y. K. Chembo, "Exact Solution for the Density Operator of Quantum Microcombs." Under review at Physical Review Letters.

**F. Liu**, C. R. Menyuk, and Y. K. Chembo, "A stochastic approach to phase noise analysis for microwaves generated with Kerr optical frequency combs." In press at Communications Physics.

G. Lin, **F. Liu**, A. Coillet, et al., "Subharmonic instabilities in Kerr microcombs." Optics Letters 48.3 (2023): 578-581.

Y. Li, Y. Yu, **F. Liu**, et al., "Topology-controlled photonic cavity based on the near-conservation of the valley degree of freedom." Physical Review Letters 125.21 (2020): 213902.

## Selected Conference Proceedings

**F. Liu** and Y. K. Chembo "A characterization of quantum Kerr optical frequency combs", Proc. SPIE 12446, Quantum Computing, Communication, and Simulation III, 2023.

**F. Liu** and Y. K. Chembo "On the phase noise of microwaves generated with Kerr optical frequency combs", Proc. SPIE 12407, Laser Resonators, Microresonators, and Beam Control XXVI, 2023.

**F. Liu** and Y. K. Chembo, "Stochastic and quantum phenomena in microcombs," 2022 IEEE Photonics Conference (IPC).

Y. Li, Y. Yu, **F. Liu**, et al., "Localizing a Topological Mode using a Near-Conservation of the Valley Degree of Freedom," 2020 Conference on Lasers and Electro-Optics (CLEO).

## Scholarships and Honors

**Dean's Fellowship**, University of Maryland, Aug. 2019

**Gong Neng Scholarship**, Nankai University, Sep. 2016, 2017 & 2018

**TIPCCAS Outstanding Undergraduate Scholarship**, Chinese Academy of Sciences, May 2017

**Po-ling Scholarship for Freshmen**, Nankai University, Oct. 2015

## Skills and Related Courses

### Computer Skills

Programming Languages: Python, C/C++, MATLAB,  $\LaTeX$

Software: COMSOL Multiphysics, Mathematica, TensorFlow, Caffe

### Selected Coursework

Statistical Pattern Recognition (A); Random Processes in Communication and Control (A); Advanced Numerical Optimization (A); Chaotic Dynamics (A+); Complex Systems in Engineering (A+); Electromagnetic Theory I/II (A+/A); Solid State Electronics (A); Semiconductor Devices and Technology (A+); Quantum Electronics I (A+)