Han Wang

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(Last Update: Oct. 2022)

EDUCATION

Nanjing University   Nanjing, China

M.E., College of Engineering and Applied Science (CEAS)   09.2018-06.2021

Major: Optical Engineering

Advisor: Prof. Xiaoshun Jiang and Dr. Shulin Ding

Research Areas: Optical frequency comb, optical microresonators, nonlinear optics, integrated photonics.

Master's Thesis: Dispersion Measurement and 1 μm Band Optical Frequency Comb Generation Based on Silica Microdisk Cavities

Harbin Institute of Technology   Harbin, China

B.E., School of Electrical Engineering and Automation   09.2014-06.2018

Major: Optoelectronic Information Science and Engineering (Optoelectronic Instrument)

Advisor: Prof. Weibo Wang

Grade: 87.84/100, **Ranking:** 9/45.

Bachelor's Thesis: Kerr Optical Frequency Combs Generation in Silica Disk Microcavity

INTERN EXPERIENCES

AI Lab, Tencent   Shenzhen, China

Technical Research Intern   04.2021-01.2022

Mentor: Dr. Jun Liao

Research Areas: Hyperspectral imaging, multispectral imaging, medical image processing, artificial intelligence.

ACADEMIC EXPERIENCES

04.2021-01.2022: Conducted research on **Multispectral, Hyperspectral Imaging and Artificial Intelligence for Medical Image Processing** at *AI Lab, Tencent.*

Advisor: Dr. Jun Liao

Project: Multispectral and Hyperspectral Imaging for Clinical Diagnosis

- Developed novel intelligent imaging systems to assist doctors in clinical diagnosis using hyperspectral, multispectral imaging and artificial intelligence methods.
- Mainly responsible for designing, building and testing multispectral imaging systems; rebuilding imaging systems at hospitals, guiding doctors to use these systems, and assisting doctors to do experiments; collecting some experimental data; processing and analyzing spectral images using artificial intelligence methods; designing and simulating microscope systems; organizing experimental data and uploading it to the cloud regularly; drawing pictures for publications.

11.2017-04.2021: Conducted research on **Generation and Applications of Microcomb based on Silica Microresonators** at *College of Engineering and Applied Science, Nanjing University.*
Advisor: Prof. Xiaoshun Jiang and Dr. Shulin Ding
Project 1: Generation and Stabilization of Soliton Microcomb at 1550nm Band
Project 2: Kerr Frequency Comb Generation at 780nm and 1050nm Bands
Project 3: Depression Simulation and Measurement of Optical Microresonators
Project 4: Optical Imaging Based on Kerr and Soliton Microcomb (only simulation!)

- Generated soliton and soliton crystal at 1550nm band, Kerr microcomb at 780 and 1050nm band; stabilized soliton microcomb through locking pump laser frequency based on PDH locking technique; simulated and measured cavity depression of silica microcavity; simulated dynamics of microcomb generation using LLE model; investigated and simulated applications of optical frequency comb for imaging, ranging and spectroscopy.

- Mainly responsible for optical experiments (Q measurement, dispersion measurement, microcomb generation and characterization); finite element simulation of cavity depression, numerical simulation of microcomb generation and comb-based imaging methods; designing and building microcomb generation, characterization and stabilization systems, dispersion measurement systems, optical coupling system from free space to fiber and optical frequency doubling system; programming for instruments to remote control and data acquisition (including: optical spectrum analyzer, lasers, oscilloscope, arbitrary wave generators and linear DC power supplies); designing driver circuits for laser diode and TEC (thermoelectric cooler); designing machine elements.

07.2016-06.2017: Conducted research on **Fourier Ptychography Microscopy** (FPM, a recently developed computational imaging method with both large field-of-view and high spatial resolution) at *Center of Ultra-precision Optoelectronic Instrument Engineering, Harbin Institute of Technology.*
Advisor: Dr. He Zhang and Prof. Jian Liu
Project: Imaging Property Improvement of FPM for Depth of Field, Time Resolution and Spatial Resolution

- Extend the depth of field of FPM combining wavefront coding technique based on cubic-phase-modulation phase mask and DMD; decreased images processing time through parallel computing; decreased images capturing time or improved spatial resolution through illumination modulation using LCD.

- Mainly responsible for numerical simulation of imaging model; building optical imaging systems based on SLM, DMD and LCD; programming to data acquisition and image processing.

02.2015-07.2015: Conducted research on **Confocal Microscopy** at *Center of Ultra-precision Optoelectronic Instrument Engineering, Harbin Institute of Technology.*
Advisor: Dr. He Zhang and Prof. Jian Liu
Project: Principle and Application of Differential Confocal Microscope System (the Freshman Year Project, ranking 1/2)

- Designed and built a differential confocal microscope system with 15nm axial resolution and three-dimensional scanning imaging, including optics, electronics, mechanics and control.

- Mainly responsible for building optical setups; writing control, data acquisition and processing program using LabVIEW; as well as testing the microscope system.

PUBLICATION

5. J. Liao*, L. Zhang*, **H. Wang**, Z. Bai, M. Zhang, D. Han, Z. Jia, Y. Liu, C. Qin, S. Niu, H. Bu, J. Yao, Y. Liu, "*Dual-mode near-infrared multispectral imaging system equipped with deep learning models improves the identification of cancer foci in breast cancer specimens*", submitted (2022).

4. L. Zhang*, J. Liao*, **H. Wang**, M. Zhang, D. Han, C. Jiang, Z. Jia, Y. Liu, C. Qin, H. Bu, J. Yao, Y. Liu, "*Shortwave infrared hyperspectral imaging improves the accuracy of pathological sampling of multiple cancer species*", under review (2022).

3. M. Zhang*, J. Liao*, Z. Jia, C. Qin, L. Zhang, **H. Wang**, Y. Liu, C. Jiang, M. Han, J. Li, K. Wang, X. Wang, H. Bu, J. Yao, Y. Liu, "*High dynamic range dual-modal white light imaging system improves the accuracy of tumor bed sampling after neoadjuvant therapy for breast cancer*", under review (2022).

2. J. Liao, X. Chen, G. Ding, P. Dong, H. Ye, **H. Wang**, Y. Zhang, J. Yao, "*Deep learning-based single-shot autofocus method for digital microscopy*", **Biomedical Optics Express**, 13: 314-327 (2022).

1. J. Gu, J. Liu, Z. Bai, **H. Wang**, X. Cheng, G. Li, M. Zhang, X. Li, Q. Shi, M. Xiao, and X. Jiang, "*Dry-etched ultra-high-Q silica microdisk resonators on a silicon chip*", **Photonics Research**, 9: 722-725 (2021).

SELECTED SKILLS

Programming: MATLAB, LabVIEW, Python, C++, Qt, Verilog HDL, Mathematica.
Hardware: FPGA, NI Data Acquisition Hardware, myRIO Embedded Device, Arduino, Raspberry Pi, Industrial Camera, 3D Camera, Liquid Lens.
Software: COMSOL Multiphysics, Lumerical FDTD, IPKISS, ZEMAX, ENVI, Multisim, Altium Designer, SolidWorks, AutoCAD, Origin, GraphPad, Adobe Illustrator.

HONOURS & AWARDS

1. Merit Student of Harbin Institute of Technology, 2016
2. Virtual Instrument Scholarship - Group Award (ranking 2/4), 2016
3. Bronze Award in *the 7th "ZuGuang Cup" Creativity, Innovation and Entrepreneurship Competition* of Harbin Institute of Technology (ranking 4/4), 2017
4. Third Prize in *the 4th National Virtual Instrument Competition* (ranking 1/5), 2017
5. First Class People Scholarship of Harbin Institute of Technology, 2017
6. First Class Graduate Academic Scholarship of Nanjing University, 2018 & 2019

TEACHING ASSISTANT

Practical Training of Optoelectronic Information Engineering, with Associate Prof. Shun Wang, autumn semester 2020, *Nanjing University*.