

Bai Yu-Ming

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Biography

I am a Ph.D. Candidate in the Department of Physics, Tsinghua University. My research lies at the intersection of quantum optics and its practical applications. In previous years, I have mastered the construction of optical experiment systems, including single-pixel imaging, digital holographic imaging, and photon entanglement. Besides, computer techniques play an important role in my study. I have learnt the preparation and use of machine learning programs from summer school project, which has been applied in my research work. And I engage in the construction and maintenance of laboratory computing servers in our research group.

In 2022, we were dedicated to the implementation of the Doppler effect and single-pixel imaging, handling the velocity detection of the axial moving targets in the field of view. I independently completed part of the research work as my undergraduate graduation project (See [1]) and collaborated for another part (See [2]).

In 2021, we first realized the concurrent imaging, location, and classification in a single-pixel imaging system, using the deep learning method (See [3]). As one of the co-first authors, I have completed the entire work on neural network programming, testing and training, and most of work on optical system construction. The repository is available on GitHub [link].

In 2020, I used to complete a digital holographic imaging system, which realized the holography recording and reconstruction using both optical and digital methods, and use the self-designed differential operators to improve imaging quality (See [4]).

Recently, I am attempting to set up the photon entanglement and coincidence counting experiment.

Education

Tsinghua University <i>Ph.D. in Physics</i> GPA: 3.85/4.0	August 2022 – Present <i>Beijing, China</i>
Tsinghua University <i>B.Sc. in Physics</i> GPA: 3.74/4.0	August 2018 – June 2022 <i>Beijing, China</i>

Research Experience

Undergraduate Graduation Project and Ph.D. Candidate <i>Tsinghua University</i> <ul style="list-style-type: none">• Construction of photon entanglement and coincidence counting experiment• Studies on computational single-pixel imaging• Establishment and maintenance of laboratory computing server	January 2022 – Present <i>Beijing, China</i>
Undergraduate Research Program on Single-Pixel Imaging <i>Tsinghua University</i> <ul style="list-style-type: none">• Concurrent Single-Pixel Imaging, Object Location, and Classification by Deep Learning• Design and program deep learning neural network and generate dataset from MNIST• Finish the writing of academic letter	September 2020 – October 2021 <i>Beijing, China</i>
Undergraduate Course Project on Holographic Imaging <i>Tsinghua University</i>	October 2020 – December 2020 <i>Beijing, China</i>

- Construction of digital holographic imaging system for teaching use
- Realization of holography recording and reconstruction using both optical and digital methods
- Using the self-designed differential operator to improve imaging quality

Student Research Training on Tensor Network

October 2019 – June 2020

Tsinghua University

Beijing, China

- Learn basic computational methods and typical models
- Improve programming skills (mainly python)
- Academic letters and reviews reading, give talks on group meeting

Other Experience

Deep Learning Summer School

July 2020 – August 2020

Tsinghua University

Online

Research Presentations

[1] **Bai, Y.-M.** Velocity Measurement in Single-Pixel Imaging using F-P Etalon. Undergraduate Graduation Thesis, Tsinghua University, Beijing, China. Jun 10th, 2022. [link]

[2] Yang, Z.; **Bai, Y.-M.**; Huang, K.-X.; Liu, Y.-X.; Liu, J.; Ruan, D.; Li, J.-L. Single-pixel full-field simultaneous spatial and velocity imaging. (under review)

[3] Yang, Z.; **Bai, Y.-M.**; Sun, L.-D.; Huang, K.-X.; Liu, J.; Ruan, D.; Li, J.-L. SP-ILC: Concurrent Single-Pixel Imaging, Object Location, and Classification by Deep Learning. *Photonics* 2021, 8, 400. (co-first author) [link]

[4] **Bai, Y.-M.** My Report on Digital Hologram. Modern Physics Laboratory, Tsinghua University. 2020. [link]

Awards & Honors

Provincial Merit Student

Beijing Municipal Education Commission

2022

Alumni Scholarship

Tsinghua University

2021

Philobiblion Scholarship

Tsinghua University

2020

Social Work Scholarship

Tsinghua University

2020 & 2022

Specialized Skills

Programming Languages: Python (advanced), C/C++ (intermediate), Mathematica (intermediate), Linux (intermediate), Matlab(basic)

Text: Latex, Office, Beamer

Soft: Leadership, Communication

Other Interests

Athletics: badminton (department team captain)

Arts: piano