Hongchao Liu

CONTACT INFORMATION

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(CV is updated on 2026 / 01)

EDUCATION

2010 / 08 - 2014 / 06 **Ph.D. in Physics** Advisor: Prof. Jiannong Wang
Department of Physics, The Hong Kong University of Science and Technology
Thesis: Electrical Transport Studies of 3D Bi-based Topological Insulators
Research interest: Micro/nano-device fabrication and electrical transport measurements of topological insulators, interfacial superconductors and related two-dimensional materials.

2006 / 09 - 2010 / 07 **B.Sc. in Physics** Advisor: Prof. Jun Xiong
Department of Physics, Beijing Normal University
Thesis: High-order Thermal Correlated Imaging
Research interest: Optical coherence and quantum optics, correlated imaging and ghost imaging.

EXPERIENCES

2025 / 08 - present **Associate Professor**
2019 / 08 - 2015 / 08 **Assistant Professor**
Institute of Applied Physics and Materials Engineering, University of Macau, Macau, China
Research interest: Computational imaging, metasurfaces, topological materials, *etc*.
2016 / 03 - 2019 / 03 **Research Fellow** Advisor: Prof. Shuang Zhang
School of Physics and Astronomy, University of Birmingham, United Kingdom
Research interest: Metamaterials.
2015 / 10 - 2016 / 01 **Research Associate** Advisor: Prof. Swee Kuan Goh
Department of Physics, The Chinese University of Hong Kong, Hong Kong
Research interest: Superconductors.
2015 / 02 - 2015 / 10 **Post-doctoral Fellow** Advisor: Prof. Jiannong Wang
2014 / 07 - 2015 / 02 **Research Assistant**
Department of Physics, The Hong Kong University of Science and Technology, Hong Kong
Research interest: Topological & 2D materials.

RESEARCH INTERESTS

I have a broad research background in computational imaging, metamaterials, topological materials, battery-related materials, electrocatalysts, etc. My recent research interests mainly focus on the single-pixel imaging, ghost imaging, and metasurface imaging.

- **Single-pixel imaging** & **Ghost imaging** & **Metasurface imaging**:
  i) Over 10 years of research experiences in ghost imaging and single-pixel imaging, with contributions in light source effect [32, 33, 34, 35, 36, 65, 68], illumination pattern design [6, 9, 10, 11, 14, 16, 19, 20, 23, 25, 50, 53], reconstruction algorithms [28, 30], single-pixel detector design [1, 7, 13], AI-based recognition [4] and relevant optical encryption applications [15, 19, 22, 27, 29].
  ii) Integrate single-pixel imaging and metasurface imaging at the first time to propose novel optical encryption schemes [12, 18, 21, 24, 31].
  iii) Participate some other research topics in metasurfaces and related materials [46, 47, 49, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 66, 67].
- **Topological materials**:
  i) Electric transport study of topological insulators Bi_2Se_3 and Bi_2Te_3 [70, 72, 92, 94, 95], superconducting proximity effect [73, 80], interfacial superconductor Bi_2Te_3/FeTe [69, 71, 81, 82, 85, 86, 87, 89, 90, 91], Dirac semimetal Cd_3As_2 [84], 2D materials WTe_2 and MoS_2 [83, 88].
  ii) Observe Weyl points [75], nodal line [76], Dirac points [74, 78], surface-state arcs [77, 79], Yang monopole [48] in topological photonics system by designing metamaterial structures.
- **Battery** & **Electrocatalysts** & **Others**:
  Design, fabricate and test perovskite detector [101, 102], battery-related materials [96, 100, 107, 111, 112, 114, 116, 117] and electrocatalysts materials [97, 98, 104, 105, 106, 110, 113, 115].

1. "Optically programmable dual-band perovskite single-pixel detector for color image encryption",
A. Fu†, Z. H. Zhang†, J. H. Xiong, X. Zhang, Z. Ye, J. Xiong, Z. P. Wei, S. Zhang*, S. P. Wang*, and **H. C. Liu***,
accepted by Light Science & Applications (2026).

2. "Polychromatic ghost interference using supercontinuum pseudothermal light",
J. H. Xiong, R. J. He, Z. Ye*, and **H. C. Liu***,
Optics Letters **50**, 5586-5589 (2025).

3. "Computational imaging and its applications",
H. C. Liu*, W. Chen*, N. Chen*, and S. Y. Xiao*,
Journal of Optics **27**, 060201 (2025).

4. "Metasurface-based single-pixel recognition through scattering media",
X. Zhang, J. H. Xiong, A. Fu, G. Zheng, Z. Li*, and **H. C. Liu***,
Applied Physics Letters **126**, 041101 (2025).

5. "Single-pixel dual-mode microscopy for simultaneous acquisition of magnitude and wrapped phase images",
Y. N. Zhao, L. Wang, H. Li, C. Liu, L. Guan, D. Z. Cao*, **H. C. Liu***, and S. H. Zhang*,
Optics & Laser Technology **182**, 112017 (2025).

6. "Computational ghost imaging with adaptive intensity illumination for scenes featuring specular surfaces",
J. H. Xiong, X. Zhang, A. Fu, and **H. C. Liu***,
Journal of Optics **26**, 045666 (2024).

7. "Perovskite single-pixel detector for dual-color metasurface imaging recognition in complex environment",
J. H. Xiong†, Z. H. Zhang†, Z. L. Li†, P. X. Zheng, J. Li, X. Zhang, Z. H. Gao, Z. P. Wei, G. X. Zheng*, S. P. Wang*, and **H. C. Liu***,
Light: Science & Applications **12**, 286 (2023). (Feature article)
Reported by Phys.org, Newswise, Nanowerk.

8. "Metalens and microtaper spectrometer on a fingertip",
P. X. Zheng, X. Zhang, and **H. C. Liu***,
Light: Science & Applications **12**, 166 (2023).
Reported by MIT Technology Review (China).

9. "Feature ghost imaging for color identification",
Z. H. Gao, M. H. Li, P. X. Zheng, J. H. Xiong, X. Zhang, Z. K. Tang*, and **H. C. Liu***,
Optics Express **31**, 16213-16226 (2023).

10. "Single-pixel real-part and magnitude imaging system based on digital micromirror device",
Y. N. Zhao, L. Wang, S. L. Bian, S. W. Cui, D. Z. Cao, B. L. Liang*, **H. C. Liu***, and S. H. Zhang*,
Applied Physical Letters **123**, 191103 (2023).

11. "Single-pixel phase microscopy without 4f system",
Y. N. Zhao, H. Y. Hou, J. C. Han, D. Z. Cao, B. L. Liang*, **H. C. Liu***, and S. H. Zhang*,
Optics and Lasers in Engineering **163**, 107474 (2023).

12. "Metasurface-assisted indirect-observation cryptographic system",
J. X. Li†, Z. Q. Guan†, **H. C. Liu**†, Z. X. He, Z. L. Li*, S. H. Yu*, and G. X. Zheng*,
Laser & Photonics Reviews **17**, 202200342 (2023).

13. "Ultra-sensitive perovskite photodetector for filter-free color single-pixel imaging",
Z. H. Zhang†, P. X. Zheng†, S. S. Yan, B. S. Qiao, K. W. Ng, **H. C. Liu***, S. P. Wang*, and Z. P. Wei*,
Advanced Optical Materials **11**, 2201847 (2023).

14. "Complex-amplitude Fourier single-pixel imaging via coherent structured illumination",
Y. N. Zhao, H. Y. Hou, J. C. Han, D. Z. Cao, S. H. Zhang*, **H. C. Liu***, and B. L. Liang*,
Chinese Physics B **32**, 064201 (2023)

15. "Algorithm-dependent computational ghost encryption and imaging",
J. H. Xiong, P. X. Zheng, Z. H. Gao, and **H. C. Liu***,
Physical Review Applied **18**, 034023 (2022).

16. "Single-pixel imaging with Gao-Boole patterns",
Z. H. Gao, M. H. Li, P. X. Zheng, J. H. Xiong, Z. K. Tang*, and **H. C. Liu***,
Optics Express **30**, 35923-35936 (2022).

17. "Anti-loss-compression image encryption based on computational ghost imaging using discrete cosine transform and orthogonal patterns",
Y. C. Liu, P. X. Zheng, and **H. C. Liu***,
Optics Express **30**, 14073-14087 (2022).

18. "Compressive imaging encryption with secret sharing metasurfaces",
P. X. Zheng†, J. Li†, Z. L. Li, S. Zhang*, G. Zheng*, and **H. C. Liu***,
Advanced Optical Materials **10**, 2200257 (2022).

19. "Computational ghost imaging encryption with a pattern compression from 3D to 0D",
P. X. Zheng†, Z. Y. Ye†, J. Xiong*, and **H. C. Liu***,
Optics Express **30**, 14073-14087 (2022).

20. "Computationally convolutional ghost imaging",
Z. Y. Ye, P. X. Zheng, W. T. Hou, D. Sheng, W. Q. Jin, **H. C. Liu***, and J. Xiong*,
Optics and Lasers in Engineering **159**, 107191 (2022).

21. "Metasurface-based key for computational imaging encryption",
P. X. Zheng†, Q. Dai†, Z. L. Li†, Z. Y. Ye, J. Xiong, **H. C. Liu***, G. Zheng*, and S. Zhang*,
Science Advances **7**, eabg0363 (2021).
Highlighted and Reported by UM News, Macau News Bureau, Macau Government Portal, etc.

22. "Inverse computational ghost imaging for image encryption",
P. X. Zheng†, Q. L. Tan†, and **H. C. Liu***,
Optics Express **29**, 21290-21299 (2021).

23. "Ghost difference imaging using one single-pixel detector",
Z. Y. Ye, J. Xiong*, and **H. C. Liu***,
Physical Review Applied **15**, 034035 (2021).

24. "Single-pixel imaging and metasurface imaging",
P. X. Zheng, Y. C. Liu, and **H. C. Liu***,
Infrared and Laser Engineering **50**, 20211058 (2021). (invited review in Chinese)

25. "Complex-amplitude single-pixel imaging using coherent structured illumination",
H. Y. Hou, Y. N. Zhao, J. C. Han, S. W. Cui, D. Z. Cao, **H. C. Liu***, S. H. Zhang*, and B. L. Liang*,
Optics Express **29**, 41827-41841 (2021).

26. "Dual-channel sensing by combining geometric and dynamic phases with an ultrathin metasurface",
Q. L. Tan†, **H. C. Liu†**, and S. Zhang*,
Optics Express **28**, 28612-28619 (2020).

27. "Computational ghost imaging with spatiotemporal encoding pseudo-random binary patterns",
Z. Y. Ye, **H. C. Liu***, and J. Xiong*,
Optics Express **28**, 31163-31179 (2020).

28. "Imaging reconstruction comparison of different ghost imaging algorithms",
H. C. Liu*
Scientific Reports **10**, 14626 (2020).

29. "Optical ghost cryptography and steganography",
H. C. Liu*, and W. Chen*
Optics and Lasers in Engineering **130**, 106094 (2020).

30. "Positive-negative ghost imaging and its optical encryption",
H. C. Liu*†, H. Yang†, S. Zhang*, and J. Xiong*
Physical Review Applied **12**, 034019 (2019).

31. "Single-pixel computational ghost imaging with helicity-dependent metasurface hologram",
H. C. Liu*, B. Yang, Q. H. Guo, J. H. Shi, C. Y. Guan, G. X. Zheng, H. Mühlenbernd, G. X. Li, T. Zentgraf, and S. Zhang*,
Science Advances **3**, e1701477 (2017).

32. "Computational ghost imaging with thermal objects in long-wave infrared range",
H. C. Liu*, and S. Zhang*,
Applied Physics Letters **111**, 031110 (2017).

33. "High-order correlation of chaotic bosons and fermions",
H. C. Liu*,
Physical Review A **94**, 023827 (2016).
Reported by American Physical Society Physics Central: The Dark Side of Ghost Imaging.

34. "The role of the degree of polarization in Nth-order thermal ghost imaging",
H. C. Liu, and J. Xiong*,
Journal of Physics B: At. Mol. Opt. Phys. **47**, 145503 (2014).

35. "Properties of high-order ghost imaging with natural light",
H. C. Liu, and J. Xiong*,
Journal of the Optical Society of America A **30**, 956-961 (2013).

36. "The impact of light polarization on imaging visibility of Nth-order intensity correlation with thermal light",
H. C. Liu, D. S. Guan, L. Li, S. H. Zhang, and J. Xiong*,
Optics Communications **283**, 405-408 (2010).

37. "Three-dimensional super-resolution microscopy: Principles, techniques, and recent advances",
Z. Gao, Y. Ling, J. Wu, C. Xie, **H. C. Liu**, and L. Kong*,
Acta Optica Sinica (Online) **3**, 0105001 (2026) (invited review in Chinese)

38. "All-purpose spatial correlations in holographic thermal light",
Z. Ye, W. Hou, R. J. He, Y. Cui, **H. C. Liu**, H. B. Wang, J. Xiong*, and K. Wang*,
under review (2026)

39. "Dynamic Vectorial Holographic Display with Electrically Reconfigurable Liquid crystal-integrated metasurface",
L. Yang, S. Zhang, Y. Cui, R. Zhao, A. Ma, J. Lin, B. Wang, J. Li, W. Ma, R. Chen, **H. C. Liu**, Y. Wang, J. Xiong, and L. Huang*,
under review (2026)

40. "Label-free correlation adaptive optics using even-symmetrical thermal light",
R. J. He, Z. Ye*, **H. C. Liu**, H. B. Wang, and J. Xiong*,
APL Photonics **10**, 126106 (2025) (Cover & Feature article).

41. "Information transmission through light-induced scattering in photorefractive crystals",
Y. Cui, X. Cui, Z. Ye*, C. X. Ding, **H. C. Liu**, H. B. Wang, and J. Xiong*,
Optics and Lasers in Engineering **196**, 109387 (2026).

42. "Progress in computational optical imaging based on generative artificial intelligence",
W. B. Wan*, P. Wang, **H. C. Liu**, H. F. Hu, and Q. G. Liu*,
Acta Photonica Sinica **54**, 0954204 (2025). (invited review in Chinese)

43. "Spatial extra-bunching effect in classical light",
C. X. Ding, R. J. He, Z. Ye*, **H. C. Liu**, H. B. Wang, and J. Xiong*,
Physics Review A **112**, 033503 (2025).

44. "Manipulating classical triple correlations for optical information processing and metrology",
W. Hou, R. J. He, Z. Ye*, X. J. Men, C. X. Ding, **H. C. Liu**, H. B. Wang, and J. Xiong*,
Photonics Research **13**, 2073-2087 (2025).

45. "Vortex memory effect of light for scattering-assisted massive data transmission",
Z. Ye, C. X. Ding, J. Zhao, W. Hou, X. J. Men, Y. Cui, **H. C. Liu**, H. B. Wang, and J. Xiong*,
Optica **12**, 281-295 (2025).

46. "Switchable two-dimensional AND and exclusive OR operation based on dual-wavelength metasurfaces",
C. Peng, T. Huang, C. Chen, **H. C. Liu**, X. Liang, Z. Li*, S. Yu*, and G. Zheng*,
ACS Nano **18**, 4424–4431 (2024).

47. "Single-celled metasurface for labeled vortex beam generator",
C. Liang, Q. Dai, T. Huang, **H. C. Liu**, Z. Guan, R. Fu, J. Tao, Z. Li, S. Yu, and G. Zheng*,
Journal of Materiomics **9**, 1520-1526 (2023).

48. "Gauge field induced chiral zero mode in five-dimensional Yang monopole metamaterials",
S. Ma, H. Jia, Y. Bi, S. Ning, F. Guan, **H. C. Liu**, C. Wang, and S. Zhang*,
Physical Review Letters **130**, 243801 (2023).

49. "A high resolution compact all-fiber spectrometer based on periodic refractive index modulation",
H. Chen†, Z. Duan†, C. Guan*, S. Gao, P. Ye, Y. Liu, J. Yang*, **H. C. Liu**, J. Shi, J. Yang, and L. Yuan,
Applied Physical Letters **122**, 231101 (2023).

50. "Fourier single-pixel imaging via arbitrary illumination patterns",
Z. D. Liu, Z. G. Li, Y. N. Zhao, S. H. Zhang, Z. Y. Ye, D. J. Zhang, **H. C. Liu**, J. Xiong, and H. G. Li*,
Physical Review Applied **19**, 044025 (2023).

51. "Dynamic holographic stereogram using temporal and perspective coherence",
X. Liu, Y. Lou*, **H. C. Liu**, J. Hu, Z. Liang, and F. Wu*,
Optics and Lasers in Engineering **169**, 107733 (2023).

52. "Multifunctional metasurface image display enabled by merging spatial frequency multiplexing and near- and far-field multiplexing",
Y. Zhou, W. Ding, Z. Li, **H. C. Liu**, R. Fu, Q. Dai*, and G. Zheng*,
Opto-Electronic Engineering **50**, 230153 (2023). (in Chinese)

53. "Full-color photon-counting single-pixel imaging",
Y. N. Zhao, H. Y. Hou, J. C. Han, **H. C. Liu**, S. H. Zhang*, D. Z. Cao, and B. L. Liang,
Optics Letters **283**, 405-408 (2021).

54. "Multi-focus optical fiber lens based on all-dielectric metasurface",
X. Y. Zhang, C. Y. Guan*, K. D. Wang, L. Cheng, J. Yang, J. H. Shi*, **H. C. Liu**, Z. H. Liu, and L. B. Yuan,
Chinese Optics Letters **19**, 050601 (2021).

55. "Optical Trapping and Separation of Metal Nanoparticles by Cylindrical Metalenses With Phase Gradients",
Z. Shen*, Z. Y. Wang, **H. C. Liu**, and Y. C. Shen,
IEEE Photonics Journal **12**, 4600810 (2020).

56. "Curved terahertz surface plasmonic waveguide devices",
M. R. Yuan, Y. C. Lu, Y. Zhang, Z. Y. Zhang, Y. F. Li, **H. C. Liu**, X. X. Zhang*, J. G. Han*, and W. L. Zhang,
Optics Express **28**, 1987-1998 (2020).

57. "Dual-functional terahertz waveplate based on all-dielectric metamaterial",
J. C. Zi, Y. F. Li*, X. Feng, Q. Xu, **H. C. Liu**, X. X. Zhang*, J. G. Han*, and W. L. Zhang
Physical Review Applied **13**, 034042 (2020).

58. "Simultaneous TE and TM designer surface plasmon supported by bianisotropic metamaterials with positive permittivity and permeability",
L. B. Xia, B. Yang, Q. H. Guo, W. L. Gao, **H. C. Liu**, J. G. Han, W. L. Zhang, and S. Zhang*,
Nanophotonics **8**, 1357-1362 (2019).

59. "Leaky-wave antenna with switchable omnidirectional conical radiation via polarization handedness",
Y. H. Liu*, M. Z. Li, K. Song, D. S. Hu, **H. C. Liu**, X. P. Zhao, S. Zhang, and M. Navarro-Cia*,
IEEE Transactions on Antennas and Propagation **68**, 1282-1288 (2019).

60. "Optical manipulation of Rayleigh particles by metalenses-a numerical study",
Z. Shen*, **H. C. Liu**, S. Zhang, Y. C. Shen, B. Zhang, and S. Luo
Applied Optics **58**, 5794-5799 (2019).

61. "Integrated dual-channel sensing utilizing polarized dissimilation based on photonic spin-orbit interaction",
X. G. Huang, X. T. Ou, Z. L. Tang, **H. C. Liu**, and Q. L. Tan*,
Optics Letters **44**, 3757-3760 (2019).

62. "Pseudospin-mediated optical spin-spin interaction in nonlinear photonic graphene",
C. Y. Guan, J. H. Shi, J. L. Liu, **H. C. Liu**, P. Li, W. M. Ye, and S. Zhang*,
Laser & Photonics Review **12**, 1800242 (2018).

63. "Circular-polarization-selective transmission induced by spin-orbit coupling in a helical tape waveguide",
Y. H. Liu*, Q. H. Guo, **H. C. Liu**, C. C. Liu, K. Song, B. Yang, Q. W. Hou, X. P. Zhao, S. Zhang, and M. Navarro-Cia*,
Physical Review Applied **9**, 054033 (2018).

64. "Wave dynamic on toroidal surface",
D. Y. Wang, C. X. Liu, **H. C. Liu**, J. G. Han, and S. Zhang*,
Optics Express **26**, 17820-17829 (2018).

65. "Robust reflective ghost imaging against different partially polarized thermal light",
H. G. Li, Y. Wang, R. X. Zhang, D. J. Zhang, **H. C. Liu**, Z. G. Li*, and J. Xiong,
Optics Communications, **410**, 213901 (2018).

66. "Manipulation of vector beam polarization with geometric metasurfaces",
Q. H. Guo†, C. Schlickriede†, D. Y. Wang†, **H. C. Liu**, Y. J. Xiang*, T. Zentgraf*, and S. Zhang*,
Optics Express **25**, 14300-14307 (2017).

67. "Controlling plasmonic orbital angular momentum by combining geometric and dynamic phases",
Q. L. Tan, Q. H. Guo, **H. C. Liu**, X. G. Huang, and S. Zhang*,
Nanoscale **9**, 4944-4949 (2017).

68. "Effect of light polarization on Hanbury Brown-Twiss experiment",
L. Li*, D. S. Guan, **H. C. Liu**, S. H. Zhang, and J. Xiong,
Acta Sinica Quantum Optica **15(3)**, 201-206 (2009). (in Chinese)

Topological Materials

69. "Robust two-dimensional superconductivity and vortex system in Bi_2Te_3/FeTe heterostructures",
H. C. Liu, H. Li, Q. L. He, I. K. Sou, S. K. Goh*, and J. N. Wang*,
Scientific Reports **6**, 26168 (2016).

70. "Shubnikov-de Haas oscillations in n and p type Bi_2Se_3 flakes",
H. C. Liu, S. G. Liu, Y. Yi, H. T. He, and J. N. Wang*,
2D Materials **2**, 045002 (2015).

71. "Two-dimensional superconductivity at the interface of Bi_2Te_3/FeTe heterostructure",
Q. L. He†, **H. C. Liu**† M. Q. He, Y. H. Lai, H. T. He, G. Wang, K. T. Law, R. Lortz, J. N. Wang, and I. K. Sou*,
Nature Communications **5**, 4247 (2014).
Highlighted and Reported by HKUST News, Hong Kong Wen Wei Po, Hong Kong Ta Kung Pao, Hong Kong Commercial Daily, Sing Tao Daily, *etc*.

72. "Tunable interaction-induced localization of surface electrons in antidot nanostructured Bi_2Te_3 thin films",
H. C. Liu†, H. Z. Lu†, H. T. He, B. K. Li, S. G. Liu, Q. L. He, G. Wang, I. K. Sou, S. Q. Shen*, and J. N. Wang*,
ACS Nano **8**, 9616-9621 (2014) .

73. "Interface effect in Nb-Bi_2Te_3 hybrid structure",
H. C. Liu, H. T. He, B. K. Li, S. G. Liu, Q. L. He, G. Wang, I. K. Sou, and J. N. Wang*,
Applied Physics Letters **103**, 152601 (2013).

74. "Observation of three-dimensional photonic Dirac points and spin-polarized surface arcs",
Q. H. Guo†, O. B. You†, B. Yang†, J. B. Sellman, E. Blythe, **H. C. Liu**, Y. J. Xiang, J. Li, D. Y. Fan, J. Chen*, C. T. Chan*, and S. Zhang*,
Physical Review Letters **122**, 203903 (2019).

75. "Ideal Weyl points and helicoid surface states in artificial photonic crystal structures",
B. Yang†, Q. H. Guo†, B. Tremain†, R. J. Liu†, L. E. Barr, W. L. Gao, **H. C. Liu**, Y. J. Xiang, J. Chen, C. Fang, A. Hibbins*, L. Lu*, and S. Zhang*,
Science **359**, 1013-1016 (2018).
Reported by Science in its Perspectives: Fermi arcs connect topological degeneracies

76. "Experimental observation of photonic nodal line degeneracies in metacrystals",
W. L. Gao, B. Yang, B. Tremain, **H. C. Liu**, Q. H. Guo, L. B. Xia, A. P. Hibbins*, and S. Zhang*,
Nature Communications **9**, 950 (2018).

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L. B. Xia†, W. L. Gao†, B. Yang, Q. H. Guo, **H. C. Liu**, J. G. Han, W. L. Zhang, and S. Zhang*,
Laser & Photonics Review **12**, 1700226 (2018).

78. "Three dimensional photonic Dirac points in metamaterials",
Q. H. Guo†, B. Yang†, L. B. Xia, W. L. Gao, **H. C. Liu**, J. Chen, Y. J. Xiang*, and S. Zhang*,
Physical Review Letters **119**, 213901 (2017).

79. "Direct observation of topological surface-state arcs in photonic metamaterials",
B. Yang†, Q. H. Guo†, B. Tremain†, L. E. Barr, W. L. Gao, **H. C. Liu**, B. Beri, Y. J. Xiang, D. Y. Fan, A. Hibbins*, and S. Zhang*,
Nature Communications **8**, 97 (2017).
Reported by Physicsworld (IOP): Chiral metamaterial enables scatter-free propagation.

80. "Origin of bias-independent conductance plateaus and zero-bias conductance peaks in Bi_2Se_3/$NbSe_2$ hybrid structures",
H. Li, T. Zhou, J. He, H. W. Wang, H. C. Zhang, **H. C. Liu**, Y. Yi, C. M. Wu, K. T. Law*, H. T. He*, and J. N. Wang*,
Physical Review B **96**, 075107 (2017).

81. "Superconductivity and oscillatory magnetoresistance at a topological-insulator/chalcogenide",
C. L. Dean, M. N. Kunchur*, N. Shahesteh-Mogaddam, S. D. Varner, J. M. Knight, B. I. Ivlev, Q. L. He, **H. C. Liu**, J. Wang, R. Lortz, and I. K. Sou,
AIP Conference Proceedings **1832**, 020001 (2017).

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J. Y. Shen, C. Heuckeroth, Y. H. Deng, Q. L. He, **H. C. Liu**, J. Liang, J. N. Wang, I. K. Sou, J. S. Schilling, and R. Lortz*,
Physica C: Superconductivity and its Applications **543**, 18-21 (2017).

83. "Thickness dependent magneto transport properties of WTe_2 thin films",
Y. Yi, C. M. Wu, H. W. Wang, **H. C. Liu**, H. Li, H. C. Zhang, H. T. He*, and J. N. Wang*,
Solid State Communications **260**, 45-49 (2017).

84. "Negative magnetoresistance in Dirac semimetal Cd_3As_2",
H. Li†, H. T. He†, H. Z. Lu†, H. C. Zhang, **H. C. Liu**, R. Ma, Z. Y. Fan, S. Q. Shen*, and J. N. Wang*,
Nature Communications **7**, 10301 (2016).

85. "Pseudogap and proximity effect in the $Bi_2Te_3/Fe_{1+y}Te$ interfacial superconductor",
M. Q. He, J. Y. Shen, A. P. Petrovic, Q. L. He, **H. C. Liu**, Y. Zheng, C. H. Wong, Q. H. Chen, J. N. Wang, K. T. Law, I. K. Sou, and R. Lortz*,
Scientific Reports **6**, 32508 (2016).

86. "Current driven vortex-antivortex pair breaking and vortex explosion in the Bi_2Te_3/FeTe interfacial superconductor",
C. L. Dean, M. N. Kunchur*, Q. L. He, **H. C. Liu**, J. N. Wang, R. Lortz, and I. K. Sou,
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95. "High-field linear magneto-resistance in topological insulator Bi_2Se_3 thin films",
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99. "Atomic layer-deposited silane coupling agent for interface passivation of quantum dot light-emitting diodes",
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110. "Recent advances in electrocatalysts for efficient nitrate reduction to ammonia",
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S. M. Lu, X. Guan, X. C. Li, W. E. I. Sha, F. X. Xie, **H. C. Liu**, J. N. Wang, F. Huang, and W. C. H. Choy*,
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Conferences Presentation

1. Invited talk: "Image encryption and recognition based on metasurface and single pixel imaging".
China Materials Conference 2025
Xiamen, China, Jul. 05-08 (2025).

2. Invited talk: "Perovskite-based single-pixel detector".
The 14th Conference on Quantum Imaging
Beijing, China, Aug. 13-16 (2024).

3. Invited talk: "Optical encryption applications for single-pixel imaging and metasurface imaging".
The 13th Conference on Quantum Imaging
Changsha, China, Aug. 14-16 (2023).

4. Oral Presentation: "Optical encryption with metasurfaces and computational imaging".
2023 Joint Annual Conference of Physical Societies in Guangdong-Hong Kong-Macao Greater Bay Area
Hong Kong, China, Jul. 31 - Aug. 04 (2023).

5. Oral Presentation: "Optical encryption with metasurfaces and computational imaging".
PhotonIcs & Electromagnetics Research Symposium
Prague, Czech Republic, Jul. 3-6 (2023).

6. Invited talk: "Metasurface imaging and single-pixel imaging".
Greater Bay Area Symposium for Wave Functional Materials
Hong Kong, China, Oct. 16-17 (2021).

7. Invited talk: "Positive-negative ghost imaging and its optical encryption".
PhotonIcs & Electromagnetics Research Symposium
Xiamen, China, Dec. 17-20 (2019).

Funding

1. Principal Investigator: MOP 440,000 (2025 / 01 - 2026 / 12)
A ghost imaging spectral camera applicable for quantitative phase imaging.
Multiple Year Research Grant of University of Macau (MYRG-GRG2024-00069-IAPME).

2. Principal Investigator: MOP 1,948,000 (2024 / 01 - 2027 / 01)
Research on real-time extraction of multi-dimensional characteristics of objects based on single-pixel imaging.
Science and Technology Development Fund from Macao SAR (FDCT/0105/2023/RIA2)

3. Principal Investigator: MOP 1,600,000 (2021 / 10 - 2024 / 09)
Research on highly-integrated and multi-dimensional real-time imaging technology based on metasurfaces.
Science and Technology Development Fund from Macao SAR (FDCT/0062/2020/AMJ)

4. Principal Investigator: MOP 280,000 (2022 / 01 - 2023 / 12)
   Robustness of ghost imaging in complex environment.
   Multiple Year Research Grant of University of Macau (MYRG2020-00082-IAPME).

5. Principal Investigator: MOP 2,089,000 (2020 / 01 - 2023 / 01)
   Rational design on high ionic conductivity of solid-state electrolyte at room temperature and its application for all solid-state battery.
   Science and Technology Development Fund from Macao SAR (FDCT/0092/2019/A2)

6. Principal Investigator: MOP 150,000 (2019 / 10 - 2022 / 10)
   Computational ghost imaging and metasurface hologram.
   Start-up Research Grant of University of Macau (SRG2019-00174-IAPME)

TEACHING

Undergraduate Course: Thermodynamics and Statistical Physics, Earth and Universe
M.Sc. Course: Special Topics in Emerging Materials
Ph.D. Course: Advanced Micro and Nano-systems: from Fundamentals to Applications

AWARDS

2019 **Outstanding Reviewer Awards** for *Journal of Optics*
Institute of physics (IOP) publishing, United Kingdom

2021-2022 & 2022-2023 **Excellence in Teaching**
Institute of Applied Physics and Materials Engineering, University of Macau

2022 & 2023 & 2024 & 2025 **World's Top 2% Scientists**
Stanford University & Elsevier

ACADEMIC SERVICES

Conference Service

- Session Committee Member: Optical Sensors, Display, and Imaging Systems,
  The 17th Pacific Rim Conference on Lasers and Electro-Optics (CLEO-PR 2026), Beijing, China, Aug. 02 - 06 (2026).
- Conference Secretary,
  2025 Joint Annual Conference of Physical Societies in Guangdong-Hong Kong-Macao Greater Bay Area, Songshan lake, Dongguan, Guangdong, China, Sep. 19 - Sep. 22 (2025).
- Session Organizer: Single-pixel Imaging and Its Advanced Applications,
  PhotonIcs & Electromagnetics Research Symposium, Abu Dhabi, The United Arab Emirates, May 03-08 (2025).
- Scientific Committee Co-Chair & Conference Secretary & Local Organizing Committee Member & Coordinator of Poster Awards & Session Chair: Astrophysics and Astronomy,
  2024 Joint Annual Conference of Physical Societies in Guangdong-Hong Kong-Macao Greater Bay Area, Macao SAR, China, Jul. 29 - Aug. 01 (2024).
- Local Organizing Committee Member & Coordinator of Poster Awards,
  The 13th Asian Meeting on Ferroelectrics jointly with the 13th Asian Meeting on Electroceramics (AMF-13 & AMEC-13), Macao SAR, China, Nov. 12-16 (2023).
- Session Chair: Metasurface Holography and Its Advanced Applications,
  PhotonIcs & Electromagnetics Research Symposium, Prague, Czech Republic, Jul. 03-06 (2023).
- Technical Program Committee Member: Biophotonics and Imaging,
  26th Optoelectronics and Communications Conference, Hong Kong, China, Jul. 03-07 (2021).
- Session Organizer and Chair: Ghost Imaging and Single Pixel Imaging,
  PhotonIcs & Electromagnetics Research Symposium, Xiamen, China, Dec. 17-20 (2019).

Journal Editor

- Guest Editor for Journal of Optics: Focus Issue on Computational Imaging and Its Applications

Journal Reviewer

Science Advances, Nature Communications, Physical Review Letters, Physical Review Applied, Physical Review A, Photonics Research, New Journal of Physics, Optics Letters, Optics Express, Light: Science & Applications, Advanced Functional Materials, Advanced Energy Materials, Advanced Optical Materials, Nano Letters, Communications Physics, Laser & Photonics Reviews, ACS Photonics, Applied Physics Letters, Nanophotonics, Journal of Applied Physics, Sensors, Optics and Laser Technology, Advanced Photonics, Frontiers in Physics, Optics Communications, IEEE Photonics Technology Letters, Journal of Optics, Chinese Optics Letters, Scientific Reports, Optics and Lasers in Engineering, Results in Physics, Journal of Physics and Chemistry of Solids, Reviews in Physics, Applied Optics, *etc.*

REFERENCES AVAILABLE

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