18 Dec Saturday 12:00 – 12:45 Chair: GAO Weibo (高炜博)

Photonic Chip for Scalable Quantum Information Processing

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Professor JIN Xian-Min is a professor at Shanghai Jiao Tong University (SJTU) and the director of Center for Integrated Quantum Information Technologies (IQIT). He received Ph.D. degree from University of Science and Technology of China (USTC) in 2008. After two-year postdoctoral research, he worked as a research associate at University of Oxford from 2010 to 2014, and was awarded Marie Curie Fellow and Wolfson College Fellow in 2012. He joined SJTU as a receipt of National Young 1000 Talents in 2014 and was promoted to a tenured full professor in 2019. His interests cover a broad spectrum ranging from quantum computing, quantum communication and quantum metrology with special focus on the subject of building large-scale quantum systems, via integrated photonics and quantum memory. He has published over 80 peer-reviewed journal papers listed in SCI, including 2 in Science, 3 in Science Advances, 7 in Nature Photonics, 1 in Nature Physics, 3 in Nature Communications, 16 in Physical Review Letters, 2 in National Science Review, 1 in Advanced Materials, 2 in NPJ Quantum Information and 6 in Optica, and more than 4000 citations with an H-index of 31.

Abstract:

Photon can be generated, manipulated and detected comparatively easier than other quantum particles, and can be transferred in a long distance without coupling with environment. Photon therefore is a promising candidate for realizing quantum information processing. However, the limitations of bulk optics have become key bottleneck preventing quantum technologies from realizing in practice. Alternatively, integrated photonics provides an elegant way to scale up quantum systems. In this talk, I will present our endeavours recently delivered in Shanghai Jiao Tong University on CMOS compatible LNOI programmable photonic chip and femtosecond laser direct written 3D photonic chip. I will present how we apply its strong capabilities of Hamiltonian engineering to quantum computing and quantum simulation, including experimental demonstrations of high-dimensional quantum walk, quantum fast hitting, quantum transport in fractal structures, and works on quantum topological photonics. In addition, I will show the chip can further improve quantum information processing by our generation and transmission of orbital angular momentum on chip, and the generation of large-scale identical quantum sources on chip.