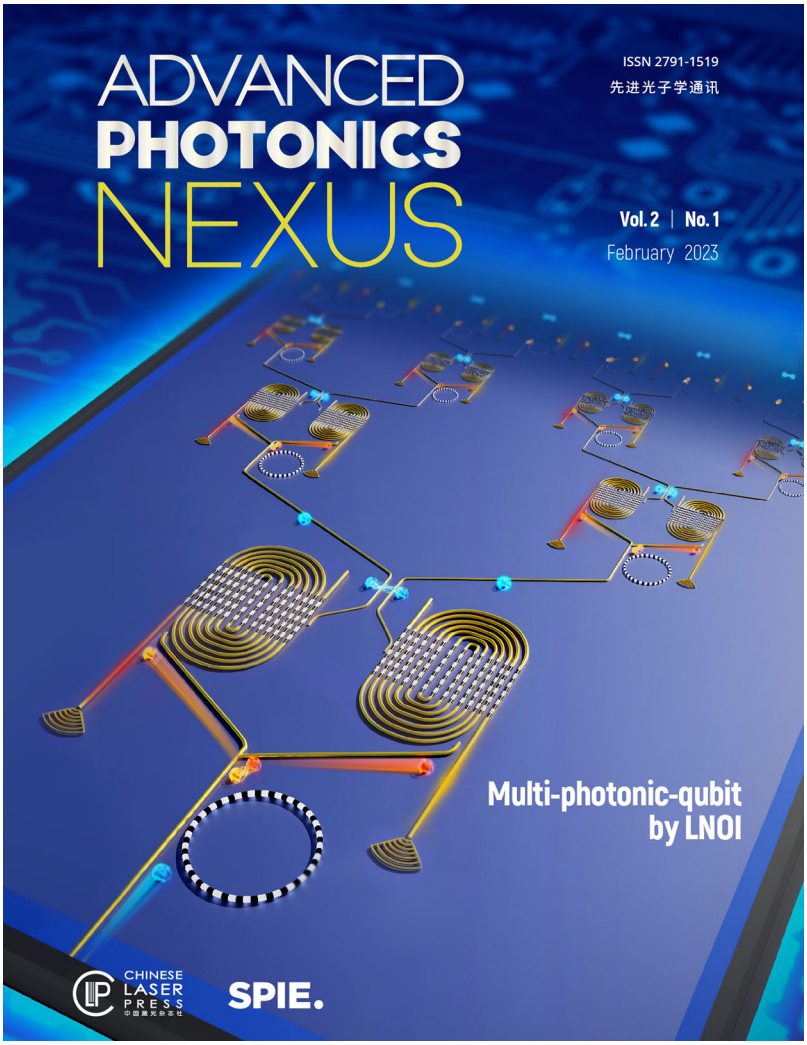

About the cover: *Advanced Photonics Nexus* Volume 2, Issue 1

Large-number (N) photon state is important for not only study of fundamental quantum physics but also practical applications of quantum information. However, due to the weak interaction between photons, generating N-photon state remains a fundamental challenge in the field of quantum optics. Researchers from Nanjing University propose the first feasible scheme for deterministic generation of N-photon states taking account of practical material capability, using the ultra-strong $\chi^{(2)}$ nonlinear interaction in the lithium niobate on insulator (LNOI) platform.

In their work, "Deterministic N-photon state generation using lithium niobate on insulator device" (doi: 10.1117/1.APN.2.1.016003) authors Hua-Ying Liu, Minghao Shang, Xiaoyi Liu, Ying Wei, Minghao Mi, Lijian Zhang, Yan-Xiao Gong, Zhanda Xie, and Shining Zhu design a standard photon-number doubling unit (PDU) composed by single photon deterministic parametric down-conversion (DPDC) and deterministic parametric up-conversion (DPUC) in an LNOI circuit, where single-photon can be converted to bi-photon without frequency change. Through such a PDU, N-photon state can in principle be generated deterministically with unlimited photon numbers.

The image on the cover for *Advanced Photonics Nexus* Volume 2 Issue 1 provides a visual rendering of this on-chip scheme for deterministic N-photon state generation in LNOI circuit, where DPDC and DPUC are realized through a high-Q microring resonator and a spiral waveguide, respectively. The research is summarized with a helpful video by first author Minghao Shang in a news story on SPIE.org, "Toward practical quantum optics: multiphoton qubits from LNOI" (https://spie.org/news/toward-practical-quantum-optics-multiphoton-qubits-from-lnoi).