## Annual Meeting of the Swiss Physical Society 2024



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## [408] On-chip time-bin-entangled quantum state generation and tomography for optical quantum communication

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Lithium niobate-on-insulator is a photonic platform gaining interest due to its wide transparency range, strong second-order nonlinearity and large electro-optic bandwidth. While lithium niobate photonics has made a significant impact in high-speed classical communication, its potential in quantum communication, particularly in entangled quantum key distribution, remains largely untapped. Leveraging the second-order nonlinearity, we generate energy-time entangled quantum states by spontaneous parametric down-conversion, and perform quantum state tomography on chip to reconstruct the density matrix with over 90% fidelity to a Bell state. Our results underscore the suitability of the platform for applications in optical communication beyond the classical domain, including high-rate and unconditionally secure quantum key distribution.

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