

Prof. Dr. Nobuyuki Imoto
(Graduate School of Engineering Science, Osaka University)

Photonic implementation of quantum information processing

Photonics has always played an important role in proof-of-concept demonstration of quantum optics, and in bringing these concepts into practice. Quantum information processing tasks such as quantum communication and distributed quantum computing either cannot be achieved without photons, or depend strongly on subsystems using sophisticated optical architectures. In our group at Osaka University, we carry out research on both theoretical and experimental aspects of quantum optics and quantum information processing.

In this talk, I will give a brief summary of our latest research results on photonic implementations in quantum information science, and then focus on a recently performed experiment on quantum computing using a four-qubit cluster state. This experiment, with its high-fidelity cluster state preparation feature, demonstrates for the first time a truly quantum computing process on cluster states.



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**Universität Stuttgart, NWZII, Raum 2.136
Pfaffenwaldring 57, 70569 Stuttgart**