Entanglement detection in Boson sampling systems with Bell inequalities

Jun-Yi Wu

Tamkang University

It has been shown that discrete-variable entanglement among multi-mode photonic systems can be generated and verified in boson sampling systems, in which photons interfere with each other in linear optical networks. However, the previous method of entanglement detection in boson sampling employs entanglement witnesses [PRA 106, 032437 (2022)], which may return a falsified signature of entanglement, if the measurements are badly implemented. To obtain a measurement-device-independent signature of entanglement, we develop a theory of entanglement detection in boson sampling systems with a special type of higher-dimensional Bell inequalities.