universität innsbruck

Department of
Theoretical Physics

Theory Colloquium

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"Heralding Higher-Dimensional Bell and Greenberger-Horne-Zeilinger States Using Multiport Splitters"

Abstract

A promising way of generating highly entangled multiphoton quantum states is heralding their generation at a high rate by letting independent photons interfere. However, such schemes often only work for a specific internal degree of freedom of the interfering photons. Going to higher numbers of entangled photons, the success probabilities decrease while the number of necessary resources, e.g., auxiliary photons and optical elements, increases. To make probabilistic schemes feasible also for larger quantum states, it is therefore important to find resource-efficient generation schemes with high success probabilities. This work introduces easily implementable schemes to herald qubit Greenberger–Horne–Zeilinger (GHZ) states, higher-dimensional Bell states, and higher-dimensional three-party GHZ states. Our schemes solely rely on multiphoton interference, i.e., they can be adjusted to work for arbitrary degrees of freedom. Furthermore, they demonstrate high success probabilities and need comparably few auxiliary photons.

Wednesday | 15.10.2025 | 5:00pm

SR 1 | ICT building