

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

momentum and position entanglement of photon pairs with phase structure¹ SHI SHUAI, LI LIN, Huazhong University of Science and Technology — The entangled quantum state spanned in a spatial domain is of special importance for fundamental research in quantum information. Previous experiments on spatial entanglement were individually studied on continuous variables of momentum and position bases and discrete variables of orbital-angular-momentum (OAM) space. Momentum and position entanglement in more complex scenarios with structured wavefronts, such as vortex phases, have not been investigated, which is promising for studying the entanglement from continuous to discrete variables in infinite Hilbert space, thus providing much needed benchmarks for studying spatial high-dimensional entanglement. Here, by measuring the transverse position or momentum of entanglement, we detect the arbitrary phase in the spatial domain, including the vortex phase dependence on the parity of OAM superposition and the relative phase in OAM superposition. Our demonstrations on spatial entanglement show a very promising way to explore high-dimensional space and different degrees of freedom of entanglement in quantum information.

¹National Natural Science Foundation of China (Grants No. 61525504, No. 61722510, No. 61435011, No. 11174271, No. 61275115, and No. 11604322)

Shi Shuai
Huazhong University of Science and Technology

Date submitted: 29 Jan 2019

Electronic form version 1.4