コヒーレント光科学セミナーのご案内

スペイン光化学研究所 (ICFO) の Adam Valles 先生が 6 月 17 日に本学を訪問されます。
ついては下記の要領でセミナーを開催いたします。
光の空間モードを用いた多次元の量子テレポーテーションについてお話し頂きます。
研究室の研究員、学生の皆様もお誘い合わせのうえ、奮ってご参加下さい。

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Coherent Optical Science Seminar on Information Optics

Date: Friday, 17 June 2022
Time: 11:00-12:00
Place: Room #803, East 6 Building, UEC

Speaker: Adam Valles
Research fellow, Institute of Photonic Sciences (ICFO)
Associate professor, Autonomous University of Barcelona (UAB)
Title: High-dimensional spatial teleportation enabled by nonlinear optics
Abstract:
Teleportation allows information exchange between two distant parties, facilitated by the sharing of entangled photons and a classical communication channel. With increased dimensionality, teleportation offers the promise of higher information capacity and improved resilience to noise, but is limited by the commonly used linear optical detection schemes that require the number of ancillary photons to grow with dimension. Here, we overcome this restriction and experimentally realise the teleportation of high-dimensional spatial information with a single entangled pair and a nonlinear spatial mode detector. We will present the demonstration of a 15 dimensional teleportation channel for unknown photonic spatial modes, exceeding the classical limit and advancing the state-of-the-art of two spatial modes for qubit teleportation, and qutrit teleportation with path entanglement. Our proof-of-principle experiment offers the first spatial basis and dimension independent approach, which we demonstrate by transferring information encoded into orbital angular momentum,

Hermite-Gaussian and arbitrary spatial mode superpositions, all with high fidelity and similarity, and without prior knowledge of the state to be sent. While our teleportation process is stimulated with a coherent source, it could in future be performed with a single photon input by advances in nonlinear optics without changing its single entangled pair configuration, offering the first versatile and scalable approach for high-dimensional teleportation of quantum information.

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