Performance metrics and design considerations for a free-space optical orbital-angular-momentum multiplexed communication link: supplementary material

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COMPARISON BETWEEN SPP BASED OAM BEAMS AND LAGUERRE-GAUSS OAM BEAMS

Fig. S1. (a) Comparison between the power loss of SPP generated OAM beams and Laguerre-Gauss beam as a function of receiver aperture size. (b) Comparison between received power of OAM+2 and OAM+3 by SPP generated OAM beams and Laguerre-Gauss beam as a function of lateral displacement when only OAM+3 is transmitted. The transmitted beam size of all beams is 3 cm and link distance is 100 m.

There are other modal sets which possess OAM for multiplexing. One such example is Laguerre-Gauss (LG) modes as mentioned in Section 2 of the main manuscript. Both an SPP based OAM beam and an LG OAM beam have similar characteristics, including helical phase front structure and doughnut intensity shape. However, a slight difference lies in their radial intensity profiles. To explore the performance differences of systems using SPP based OAM beams and LG OAM beams, Fig. S1 shows the comparisons of power loss as well as power distribution of these two beams over a 100-m link due to the limited-size receiver aperture and the later displacement, respectively. Both beams show similar trends, indicating their similar properties for a communication system.