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Abstract:	Internal modes of light can be used for efficient realization of any discrete arbitrary unitary matrix. For n_s spatial modes and n_i internal modes of light, we present a scheme for realizing $(n_s n_i) \times (n_s n_i)$ dimensional Quantum Fourier Transform (QFT) matrix. A generalized scheme for decomposing QFT matrix into physically realizable matrices corresponding to spatial and internal transformations is developed and then demonstrated for various choices of spatial and internal modes in realizing four-dimensional, eight-dimensional and twelve-dimensional QFT matrices. This decomposition reduces the number of beam splitters required for implementing QFT matrices, with an addition of internal transformations. Furthermore, implementation of the permutation matrices involved in realization of QFT are investigated.
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