Photonic quantum information processing: generalized concurrence of multimode photonic states[1] DMITRY USKOV, Brescia University and Tulane University — The first theoretical proposal of implementing measurement-induced photonic gates was limited to controlled-NOT gates of perfect fidelity (Knill et al, Nature 46-52 (2001)). Recent work on numerical optimization of such gates allowed to extend this method to tree-qubit gates and to find optimal schemes for generic two-qubit entangling gates (Uskov et al, Phys. Rev. A **81**, 012303 (2010)) Since straightforward numerical simulations in quantum information theory are inherently limited to low-dimensional cases, we develop and exploit a group-theoretical method of constructing generalized multivariable concurrence of multimode multiphoton states. As an application, we perform analysis of success probability of photonic gates with compromised fidelity. Implications of these results for photonic cluster state generation/computation are discussed.

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