Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

A General Linear-Optical Quantum State Generator[1] DMITRY USKOV, Tulane University, NICKOLAS VANMETER, PAVEL LOUGOVSKI, JONATHAN DOWLING, Louisiana State University — We introduce a notion of a linear-optical quantum state generator. This is a device that prepares a desired quantum state using product inputs from photon sources, linear-optical networks, and post-selection using photon counters. We show that this device can be concisely described in terms of polynomial equations and unitary constraints. We illustrate the power of this language by applying the Groebner-basis technique along with the notion of vacuum extensions to solve the problem of how to construct a quantum state generator analytically for any desired state, and use methods of convex optimization to identify success probabilities. In particular, we disprove a conjecture concerning the preparation of the maximally path-entangled NOON-state by providing a counterexample using these methods, and we derive a new upper bound on the resources required for NOON-state generation.

[1]This work is funded by the Army Research Office and the DisruptiveTechnologies Office

Uskov Dmitry
Tulane University

Date submitted: 02 Feb 2007 Electronic form version 1.4