Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Optimization in optical systems revisited: Beyond genetic algorithms[1] DENIS GAGNON, JOEY DUMONT, LOUIS J. DUBÉ, Universite Laval, Quebec (Canada) — Designing integrated photonic devices such as waveguides, beam-splitters and beam-shapers often requires optimization of a cost function over a large solution space [1]. Metaheuristics – algorithms based on empirical rules for exploring the solution space – are specifically tailored to those problems. One of the most widely used metaheuristics is the standard genetic algorithm (SGA), based on the evolution of a population of candidate solutions. However, the stochastic nature of the SGA sometimes prevents access to the optimal solution. Our goal is to show that a parallel tabu search (PTS) algorithm is more suited to optimization problems in general, and to photonics in particular. PTS is based on several search processes using a pool of diversified initial solutions. To assess the performance of both algorithms (SGA and PTS), we consider an integrated photonics design problem, the generation of *arbitrary* beam profiles using a two-dimensional waveguide-based dielectric structure [2].

[1] A. Vukovic, P. Sewell, and T. M. Benson, J. Opt. Soc. Am. A **27** (2010), no. 10, 2156–2168.
[2] D. Gagnon, J. Dumont, and L. J. Dubé, J. Opt. Soc. Am. A **29** (2012), no. 12, 2673–2678.

[1]The authors acknowledge financial support from the Natural Sciences and Engineering Research Council of Canada (NSERC).

Denis Gagnon
Universite Laval, Quebec (Canada)

Date submitted: 23 Jan 2013 Electronic form version 1.4