Meysam Namdari
Technische Universität Dresden
Ising machine using integrated photonics: Feasibility study for the realization of OPOs in silicon waveguides

Ising chains implemented using pulsed optical parametric oscillators (OPOs) have recently been demonstrated as a promising scalable simulated annealing platform. Current implementations of optical Ising machines use OPOs based on either Chi2 optical nonlinearity in LiNbO3 or Chi3 optical nonlinearity in optical fiber. In this paper, we will study the feasibility of the realizing OPOs and free carrier oscillators in a silicon waveguide for on-chip, spatially multiplexed optical Ising machines. Required parameters of a ring resonator to be used for an OPO or free carrier oscillator, e.g. optical power, dimensions, dispersion, and carrier life time are analyzed. This study can provide a scalable solution for the realization of commercial Ising machines.

Mircea Catuneanu (Technische Universität Dresden), Ryan Hamerly (National Institute of Informatics), Dodd Gray (Stanford University), Christopher Rogers (Stanford University), Hideo Mabuchi (Stanford University) and Kambiz Jamshidi (Technische Universität Dresden)