Abstract Submitted
for the FWS17 Meeting of
The American Physical Society

Single-core and Dual-core Fiber Optical Parametric Oscillators DEEPAK SAPKOTA, JAY E SHARPING, Univ of California - Merced — We report on two designs for fiber-optic parametric oscillators (FOPOs): a single-core system which exhibits interesting polarization behavior, and a dual-core design which we expect will provide wavelength flexibility and exponential gain. In a single-core FOPO, polarization-based output coupling leads to an increase of output power by 20%-30% compared with a non-polarization-based output coupling. We present a geometrical visualization of the polarization through the Poincare sphere and compare with experimental results. The coupling coefficient between cores in a dual-core FOPO provides additional phase-matching flexibility. Our proposed dual-core fiber has a coupling coefficient of 0.42 m^{-1} and nonlinear coefficient of 1.6 $W^{-1}km^{-1}$ in a weakly guided mode which should deliver exponential gain dependence on the pump power under a variety of conditions. We anticipate that this system will be a unique platform for quantum optics where signal and idler photons are generated indistinguishably in both cores of the fiber.

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Date submitted: 29 Sep 2017 Electronic form version 1.4