Abstract Submitted for the NWS07 Meeting of The American Physical Society

Utra-bright compact sources of correlated photons based on SPDC in periodically-poled KTP RAY BEAUSOLEIL, MARCO FIORENTINO, SEAN SPILLANE, HP Laboratories, TONY ROBERTS, PHIL BATTLE, MARK MUNROE, ADVR — Photon pairs generated using spontaneous parametric down- conversion (SPDC) have been a central ingredient for a number of quantum optics experiments ranging from the generation of entanglement to demonstrations of quantum information processing protocols. The flux of pairs generated by SPDC sources has been steadily growing over the years opening the door to practical applications of correlated and entangled photon pairs. SPDC sources based on periodically poled waveguides have shown a great potential to generate large numbers of correlated pairs with a few μW of pump. These works, however, lack a clear explanation of the increased pair rate in waveguides and do not directly compare the waveguide result with bulk. Naïvely, field confinement in waveguides is not expected to enhance pair generation rate, since SPDC is a scattering phenomenon that only involves *one* pump photon and therefore does not benefit from higher photon densities created by focussing. In this talk we present a theoretical and experimental comparison of spontaneous parametric down-conversion in periodically poled waveguides and bulk KTP crystals. We measured a waveguide pair generation rate of $2.9 \cdot 10^6$ pairs/s per mW of pump in a 1-nm band: more than 50 times higher than the bulk crystal generation rate.

> Ray Beausoleil HP Laboratories

Date submitted: 21 Apr 2007

Electronic form version 1.4