Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quasi-phase-matched Cerenkov radiation generation in a two-dimensional nonlinear photonic crystal waveguide S.N. ZHU, Y. ZHANG, Z. QI, G. ZHAO , W. WANG, Nanjing University, NATIONAL LABORATORY OF SOLID STATE MICROSTRUCTURES & PHYSICS DEPARTMENT TEAM — In this report, we present a new type of quasi-phase-matched Cerenkov radiation generation from a two-dimensional nonlinear photonic crystal waveguide: a hexagonally poled $LiTaO_3$ waveguide. The waveguide was fabricated by field poling followed by proton exchange technique. The fundamental source was a LD-pumped, 90-ns pulsed Q-switch double wavelength Nd:YAG laser at 1064-μm and 1319-μm. The pulse repetition rates was 8-kHz. When the fundamental beams at 1064-μm and 1319-μm were collinearly focused into the waveguide and propagated along its x-axis, three sets of hexagonal patterns, with red, yellow and green colors, were respectively exhibited on the projection screen behind the waveguide at the same time. They were confirmed to be the second-harmonic generation (red and green patterns) and sum-frequency generation (yellow pattern) for these two fundamental waves, respectively. These frequency conversion processes were realized by guided-to-radiated mode interaction. Phase-matching for these processes in the waveguide was automatically achieved by a quasi-phase-matched Cerenkov configuration.

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Date submitted: 10 Nov 2006 Electronic form version 1.4