Picosecond pulsed squeezed vacuum generation with a periodically poled stoichiometric $LiTaO_3$ waveguide

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Periodically poled crystals, including periodically poled $KTiOPO_4$ (PPKTP) and periodically poled $LiNbO_3$ (PPLN), are popular squeezers in recent years [1,2]. While the squeezing performance of periodically poled stoichiometric $LiTaO_3$ (PPSLT) has been rarely investigated, it has the potential in squeezing generation, due to its high nonlinear coefficient and high optical damage threshold [3,4]. In this report, we introduce our experimental results of squeezed vacuum generation with a PPSLT waveguide.

Fig. 1 shows our experimental setup. A commercial Ti:sapphire (TiS) picosecond pulsed laser source was used. Second-harmonic pulses produced by a 3-mm bulk PPSLT crystal acted as pump light. Squeezed vacuum was generated by a 3-mm PPSLT crystal with a waveguide structure. Balanced homodyne detection scheme was applied for detecting squeezed vacuum. Two acousto-optic modulators were employed to shift the frequencies of signal light and local oscillator, respectively.

Fig. 2(a) shows the squeezing result. A maximum of –1.19-dB squeezing was realized at a pump power of 9 mW. Fig. 2(b) shows the pump power dependence of anti-squeezing/squeezing level. OPA gain exceeding 7-dB was realized. The squeezing level is still limited by optical loss and total detection efficiency. More details will be provided in the presentation.

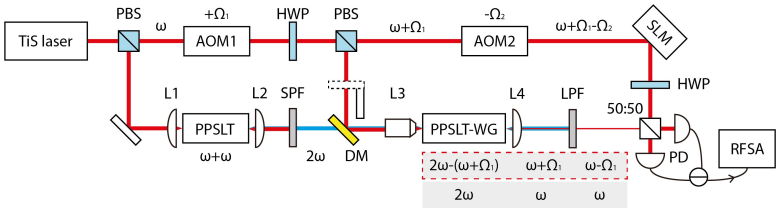

Fig. 1. Schematic of experimental setup. Signal light is blocked in squeezed vacuum generation.

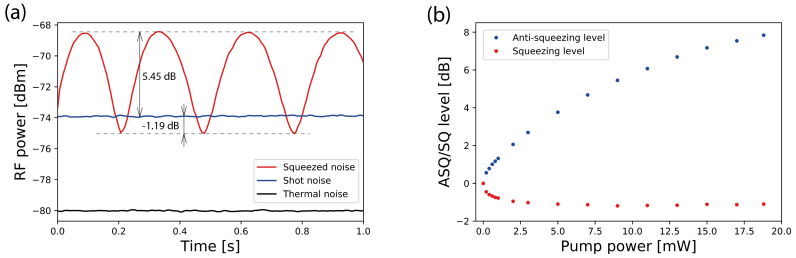

Fig. 2. (a) RF power of the balanced homodyne detector. (b) Pump power dependence of anti-squeezing/squeezing level.

Reference

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