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量子通信中单光子探测器的实验研究

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摘要：

为了提高单光子探测系统的灵敏度，实验采用InGaAs/InP雪崩光电二极管作为量子通信中的单光子探测器件，以门控脉冲模式实现了更高精度的单光子探测器的偏压生成电路、单光子信号放大电路、单光子信号检测电路和温度控制模块，并通过选用高精度前置放大器OP37和精密比较器AD8561，将量子效率提高到18.3%，暗计数控制小于4.1%×10-6/ns。

关键词： 单光子探测 门脉冲模式 雪崩光电二极管 量子通信

Single photon detection used in quantum communication

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Abstract:

In order to improve the sensitivity of single-photon detection systems, InGaAs/InP avalanche photodiode (InGaAs/InP APD) is used in the design of single photon detector of quantum communication. Single photon detector bias generation circuit in gate pulse mode, single-photon signal amplification circuit, single photon signal detection circuit and temperature control module were realized. By selecting high-precision OP37 preamplifier and precision comparator AD8561, quantum efficiency was increased to 18.3%, dark count was controlled within 4.1 × 10-6/ns.

Keywords: single-photon detection gate pulse mode InGaAs/InP APD quantum com-munication

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