

光电仪器

## 单光子探测器APD无源抑制特性研究

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**摘要** 为了选择高性能单光子探测器件, 采用无源抑制方法对工作在盖革模式下的雪崩光电二极管 (APD: avalanche photodiode) 特性进行了测量。利用APD两端的电压在雪崩后趋于稳定的特性, 获得了一种确定暗击穿电压的方法。特性测量实验结果表明: 降低温度能加宽APD的最佳工作区域范围, 并提高最佳增益值,

从而使APD具有更高的灵敏度。通过对EG&G系列APD和外延APD暗电流和信噪比特性进行比较, 发现外延APD具有良好的噪声性能和信噪比性能, 适用于单光子探测。

**关键词** [量子保密通信](#) [雪崩光电二极管](#) [单光子探测器](#) [无源抑制特性](#)

分类号

## Research on characteristics of avalanche photodiode with passive quenching method

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**Abstract** The passive quenching method is used to characterize InGaAs/InP avalanche photodiode (APD) operating in Geiger mode. Based on the feature that the voltages of APD terminals tend to be stabilized after avalanche, a new passive quenching method is put forward to determine dark breakdown voltage. The experiment indicated, with the decrease of the temperature, the optimum operating area of APD became wider, the optimum gain of APD was increased, and APD's sensitivity was improved. By comparing the dark current and the signal to noise ratio of EG&G with those of Epitaxy APD, it is discovered that Epitaxy APD is preferable for single photon detection due to its low noise level and high signal to noise ratio. The study on characteristics of different APDs is helpful to choose proper type of single photon detector for quantum communication.

**Key words** [quantum communication](#) [avalanche photodiode \(APD\)](#) [single photon detector](#) [passive quenching](#)

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