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High resolution gamma-ray spectroscopy at high count rates with a prototype High Purity Germanium detector

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1 **High Resolution Gamma-Ray Spectroscopy at High Count Rates with a Prototype**
2 **High Purity Germanium Detector**

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10 **Abstract**

11 High-resolution gamma-ray spectrometers are required for applications in nuclear
12 safeguards, emergency response, and fundamental nuclear physics. To overcome one of
13 the shortcomings of conventional High Purity Germanium (HPGe) detectors, we have
14 developed a prototype device capable of achieving high event throughput and high
15 energy resolution at very high count rates. This device, the design of which we have
16 previously reported on, features a planar HPGe crystal with a reduced-capacitance strip
17 electrode geometry. This design is intended to provide good energy resolution at the
18 short shaping or digital filter times that are required for high rate operation and which are
19 enabled by the fast charge collection afforded by the planar geometry crystal. In this
20 work, we report on the initial performance of the system at count rates up to and
21 including two million counts per second.

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