

An amplifier for VUV photomultiplier operating in cryogenic environment

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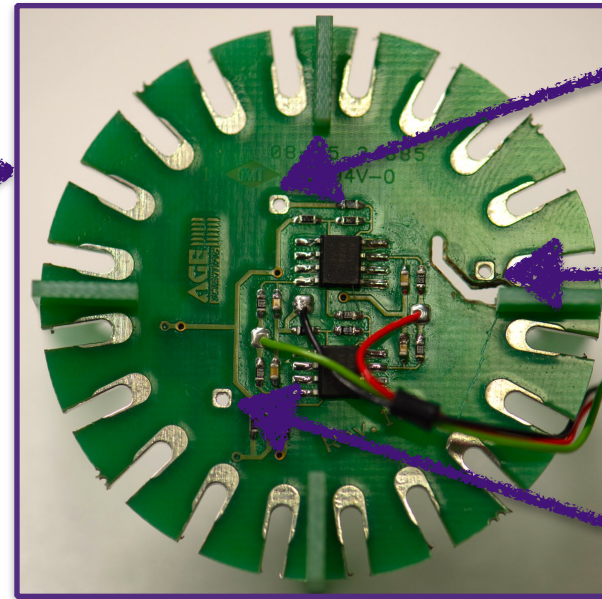
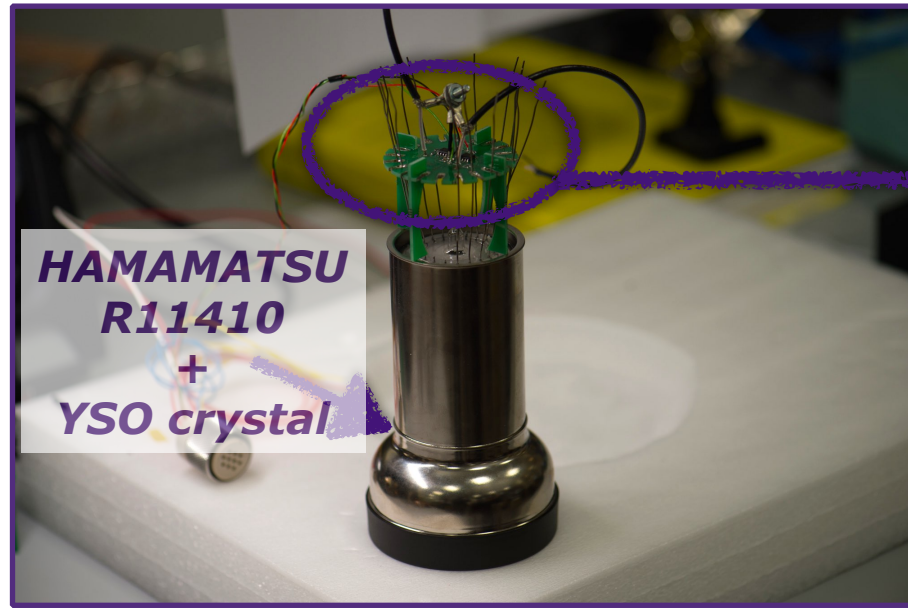


M. d'Inzeo, G. Franchi

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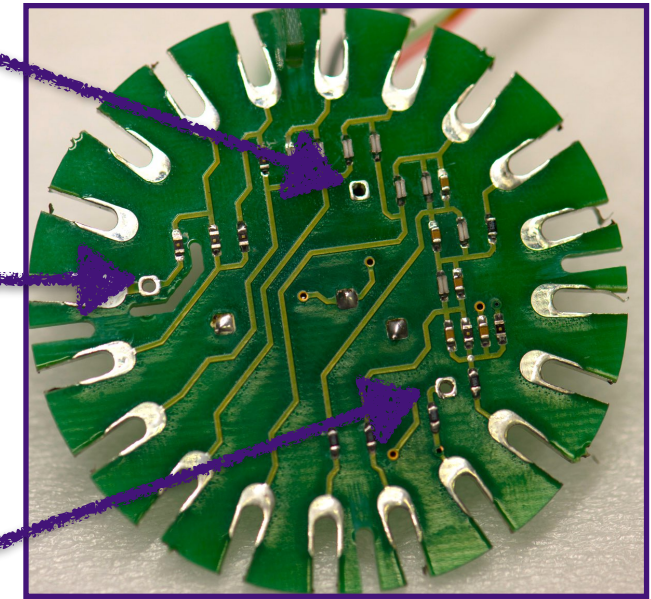
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10X Output

HV Input

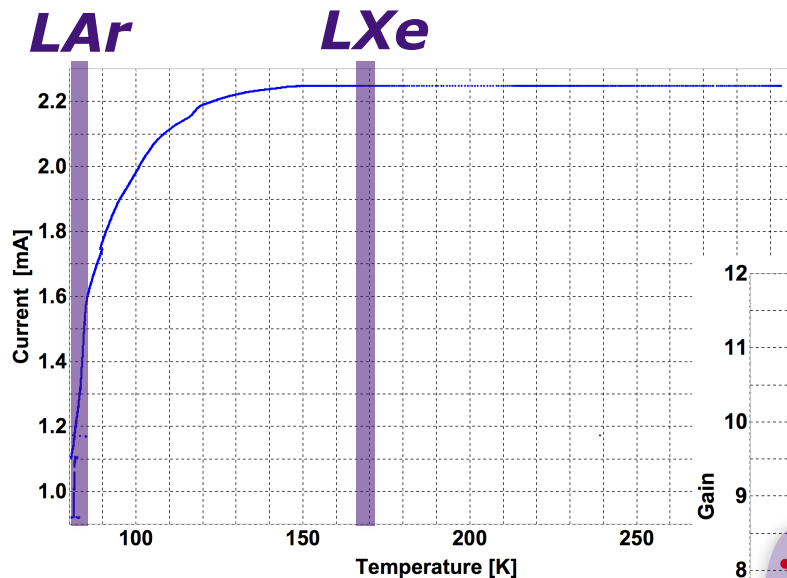
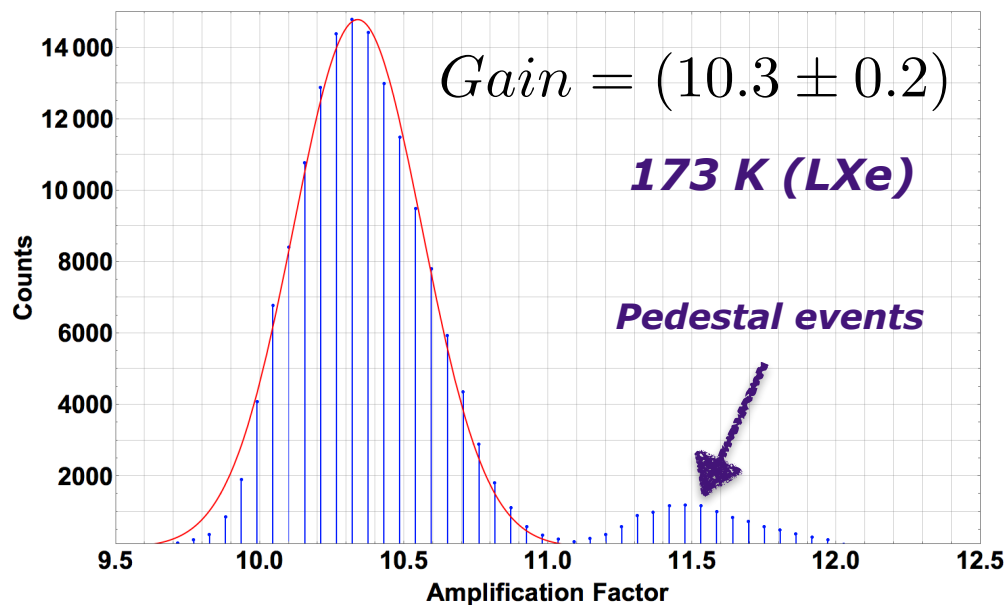
1X Output



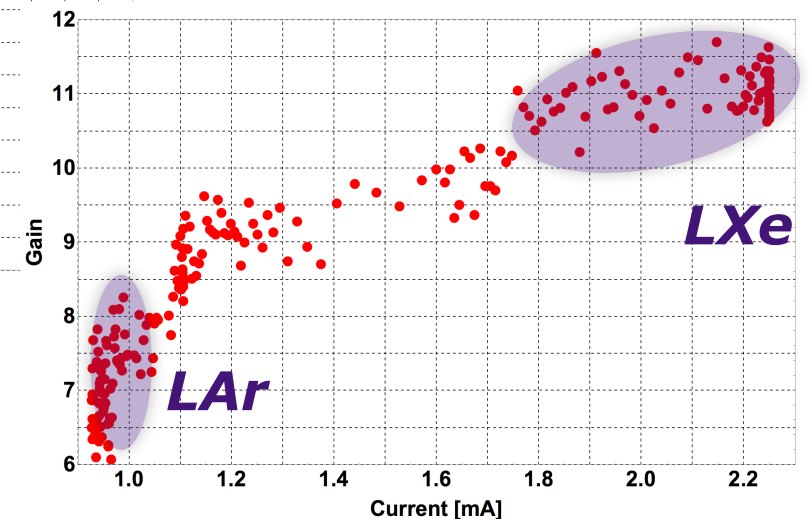
Voltage Divider Side

Main features:

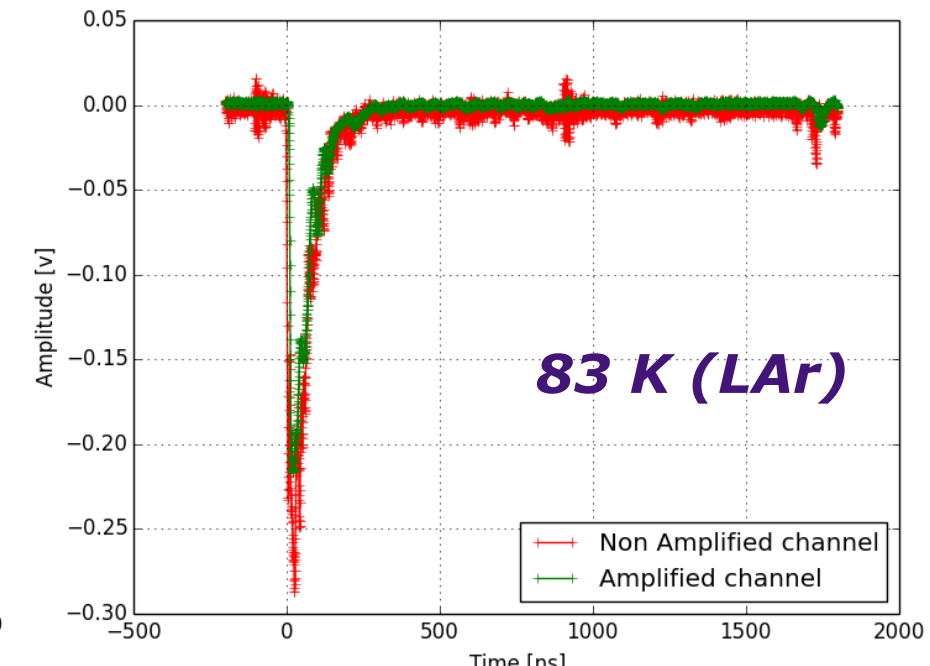
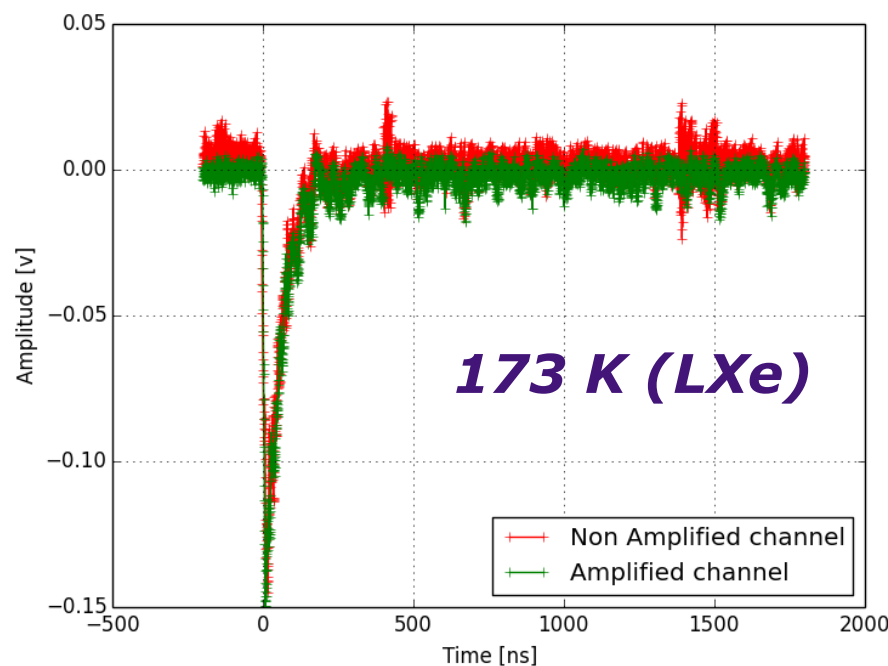
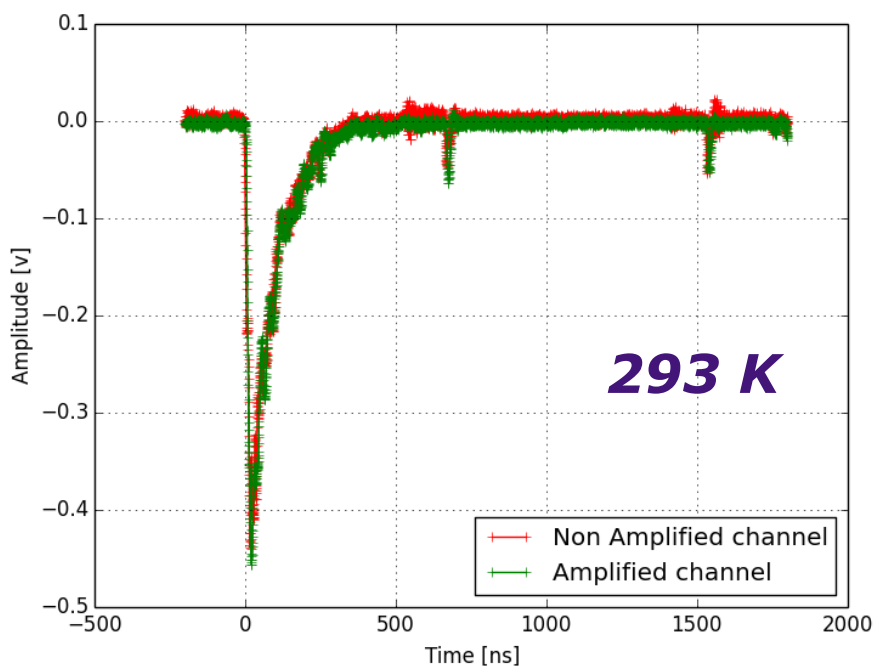
- double output (1X and 10X amplified channels, nominal bandwidth 100 MHz)
- commercial components
- low power consumption:
 - (20 mW, 173 K, 10X amplification)
 - (10 mW, 83 K, 7X amplification)
- voltage divider on board



Gain vs Absorbed Current



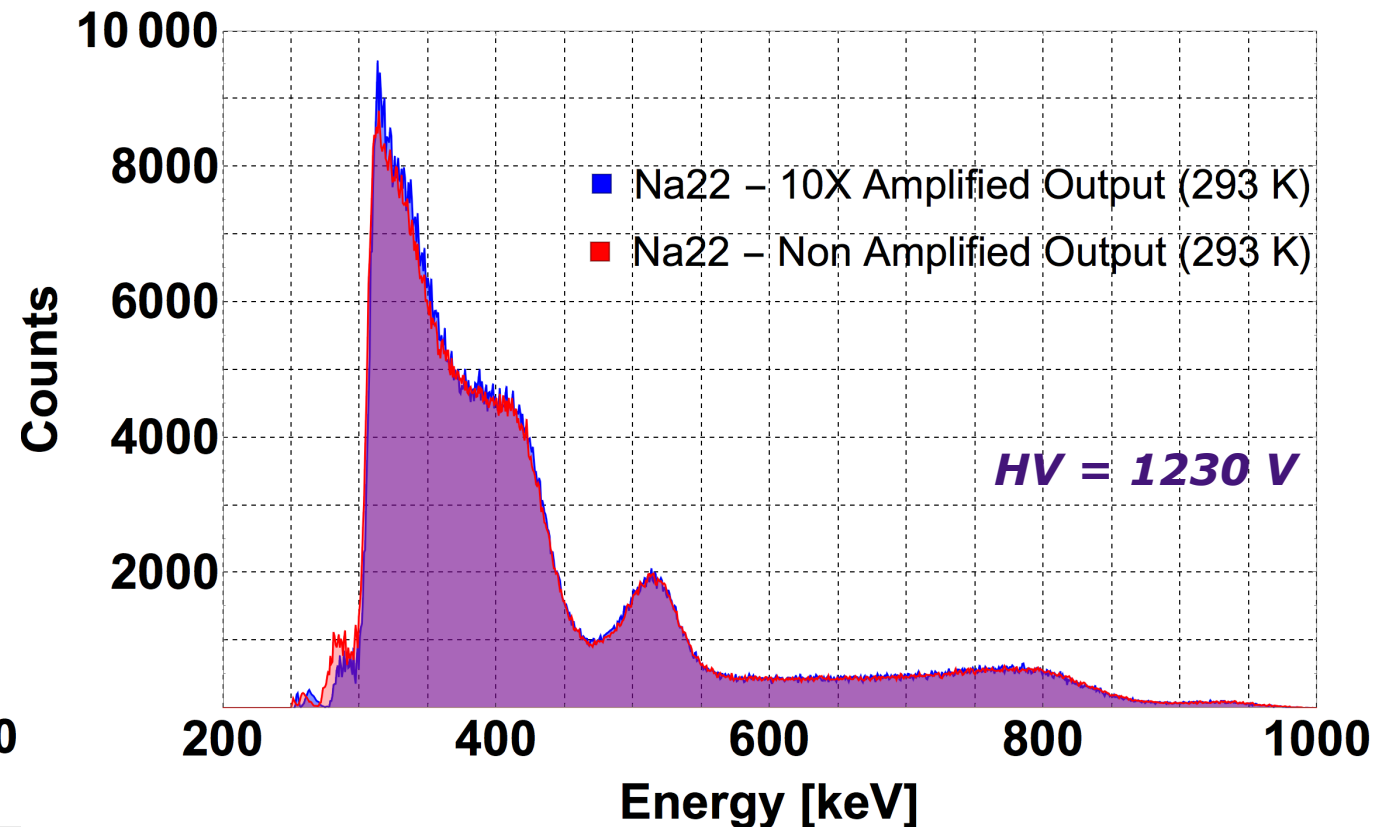
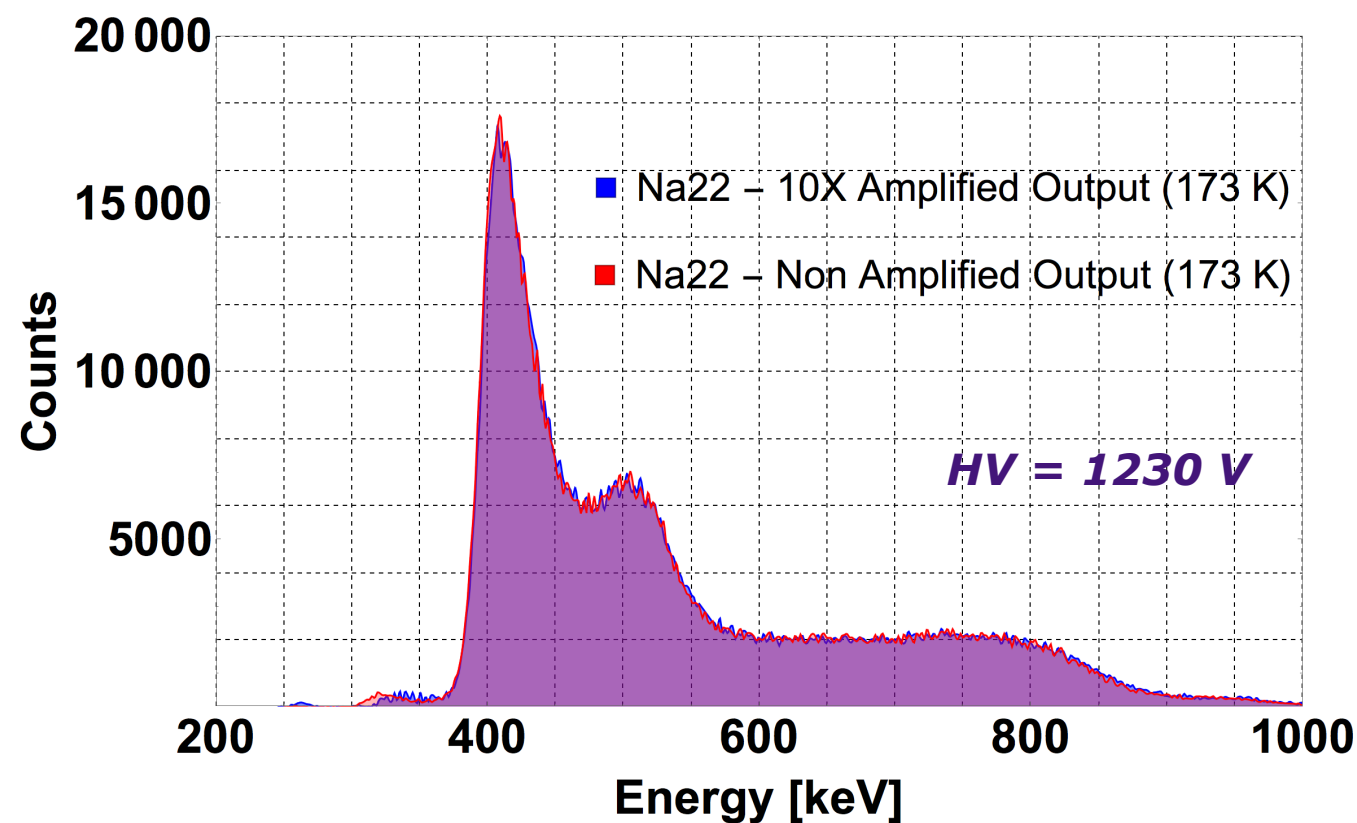
Signal amplification at different temperatures (10 factor scale for red waveforms):



10X amplification up to LXe temperature.

~7X amplification at LAr temperature.

Na22 gamma ray spectra at 173 K and 293 K using 1X (Red, factor 10 of scale) and 10X (Blue) outputs.



The 1X- and 10X-based spectra superimpose: low temperature reduces the PMT gain, while the preamplifier performance is unaffected.