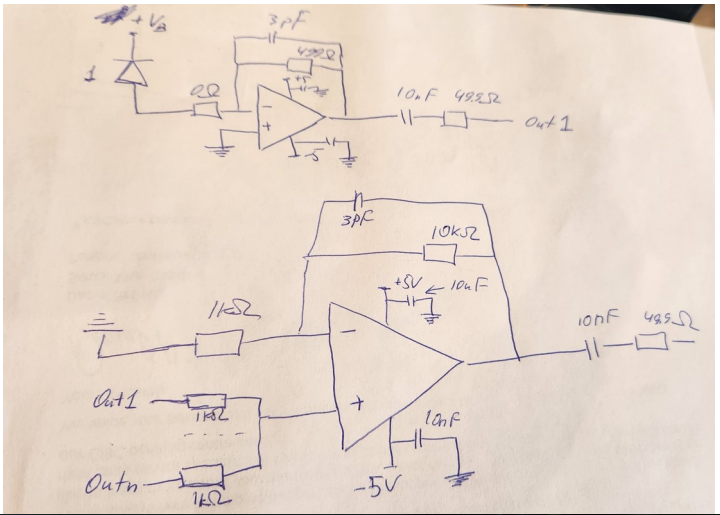
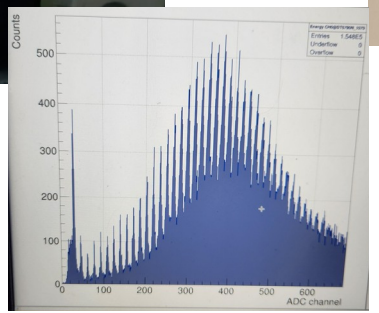
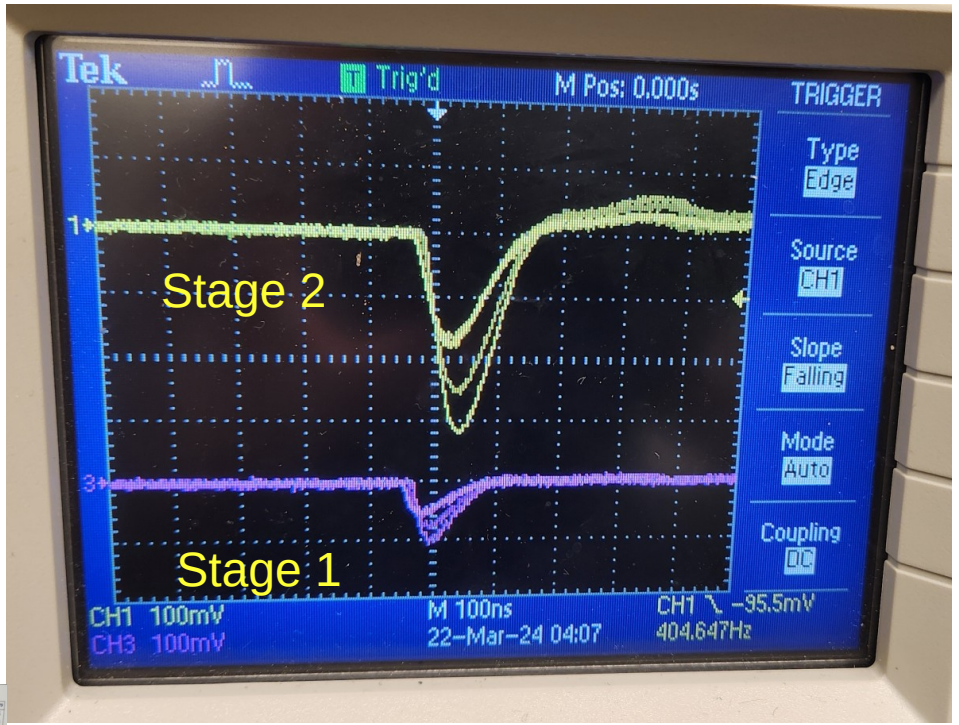
SiPM readout basic design





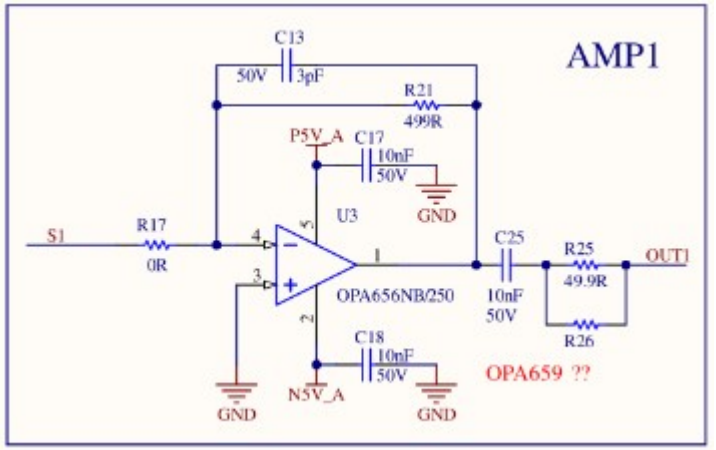
Signals clean enough to see up to 30+ single photons! Readout with CAEN DT5790

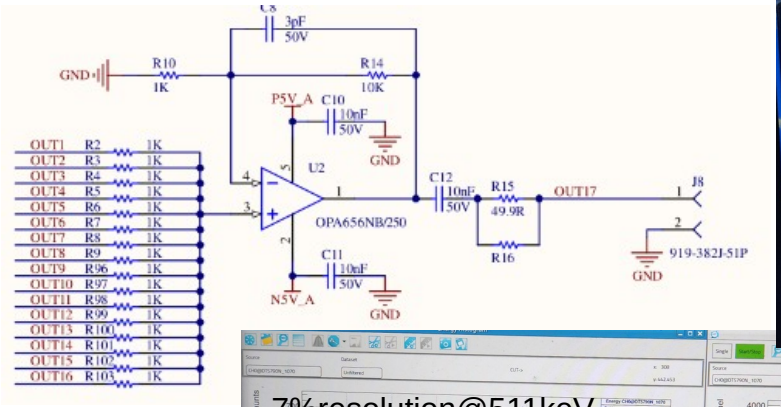


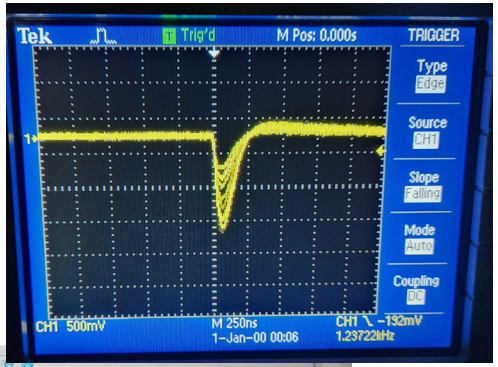
Tested with single 3x3 mm^2 SensL C-series sipm .. mid 2023?

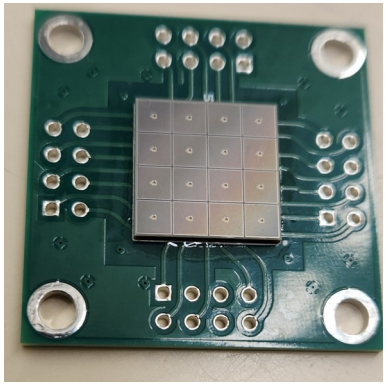
Disipated power ~0.3W per sipm

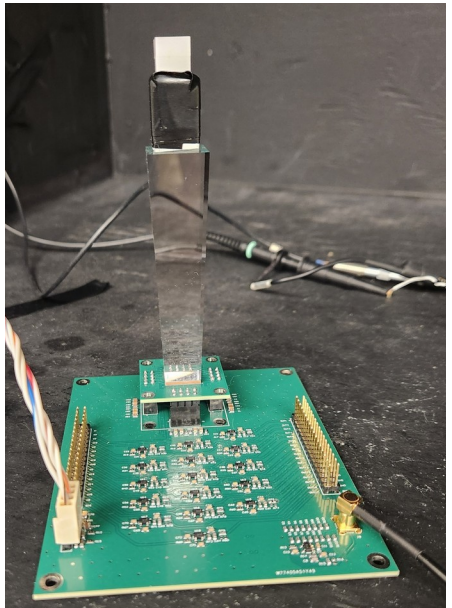
SipM 16 channel readout

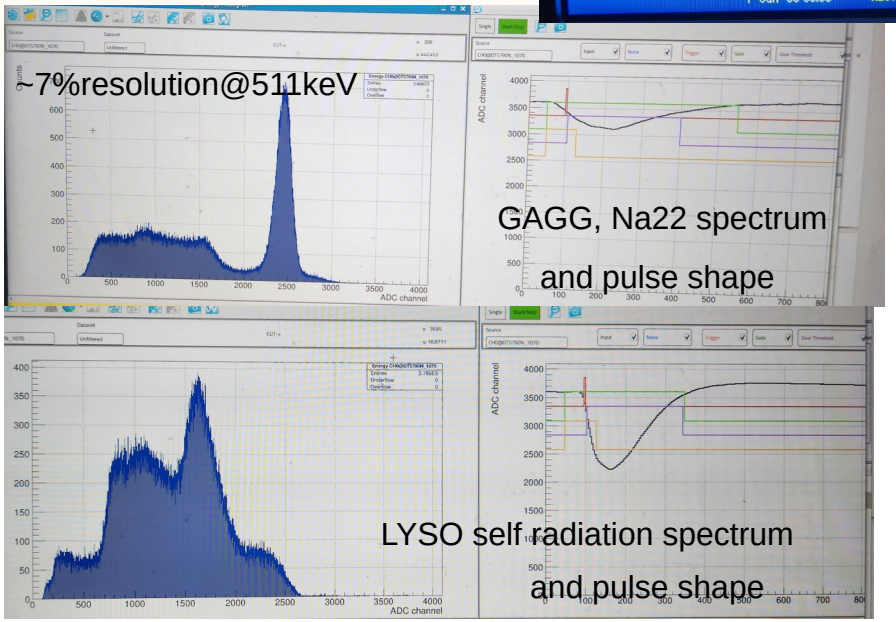






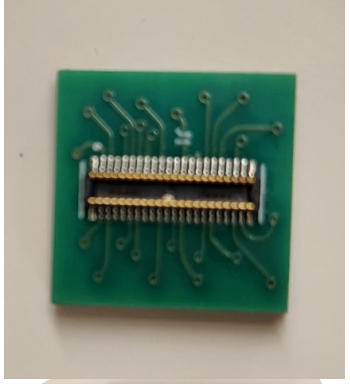


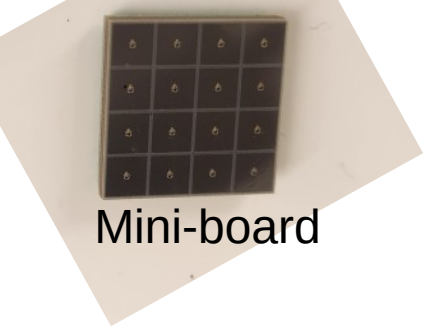




Good resolution but a **power hog ~2.5W per 4x4 sipm array!!**

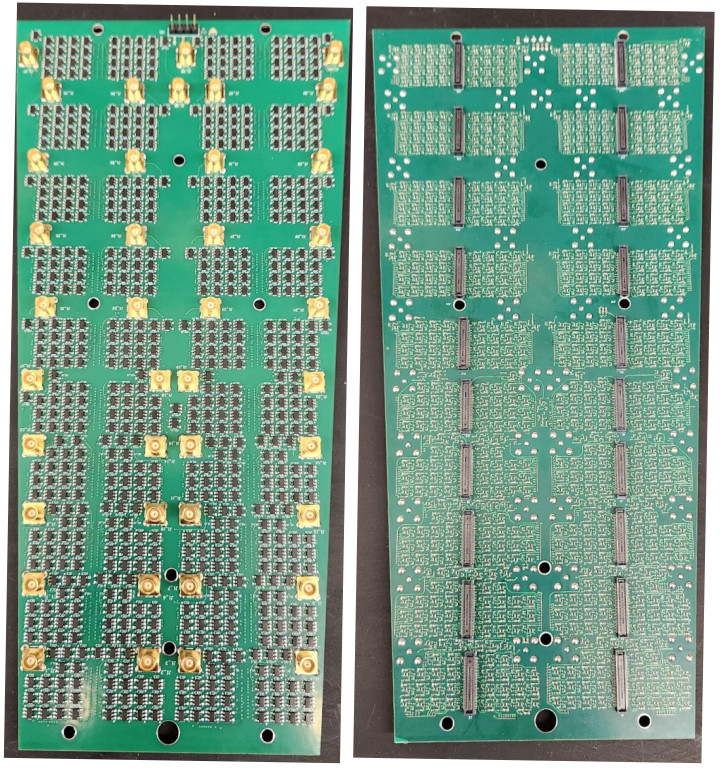
Baby BCAL readout based on 16 channel readout

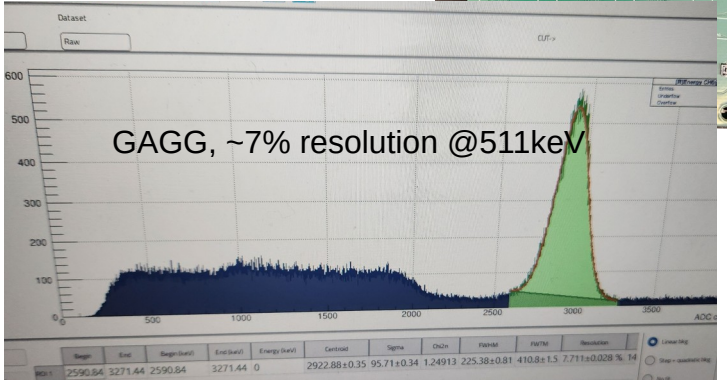




Mini-board

Window board



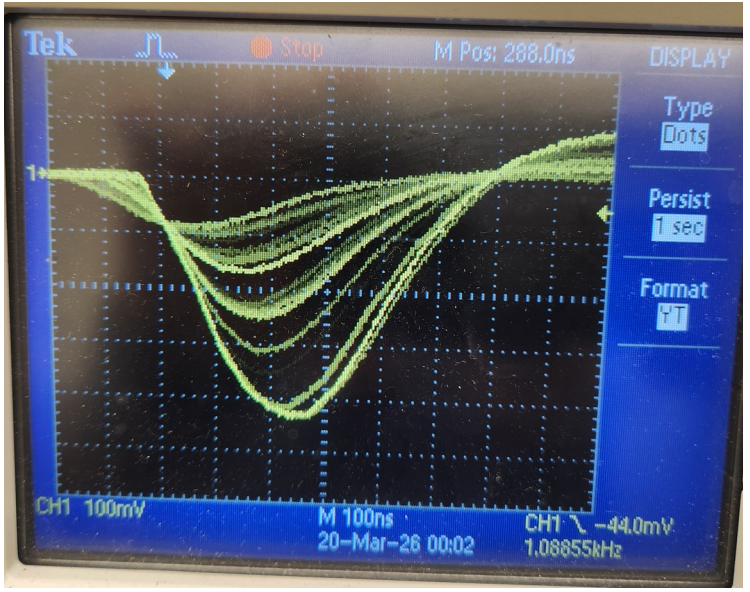


GAGG, ~7% resolution @511keV

Amplifier board for 40 sipm arrays
16 channels each.

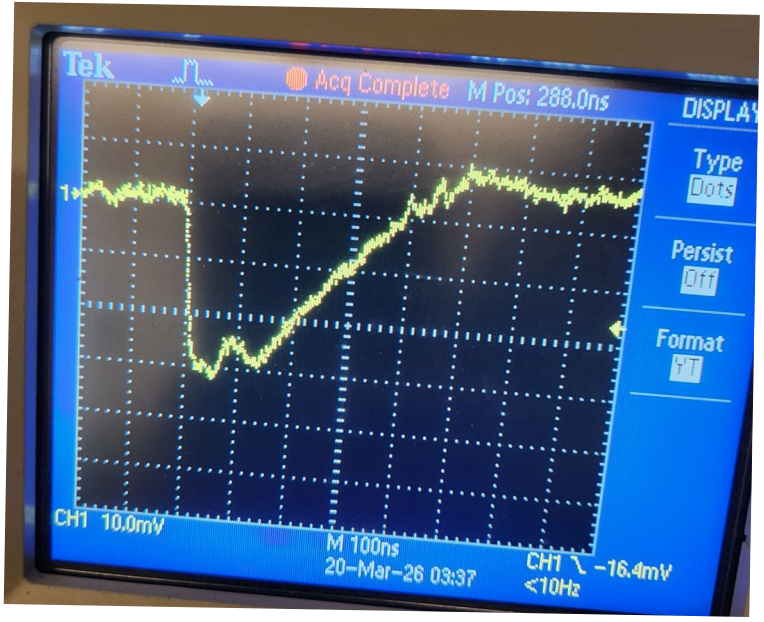
Only ~8W! For entire board

Baby BCAL readout based on 16 channel readout



GAGG, pulse shape of 16 sipm SUM with ^{22}Na source

- Pulses are ~500-600ns at the base
- Rise time ~130ns (88ns is the scintillator)



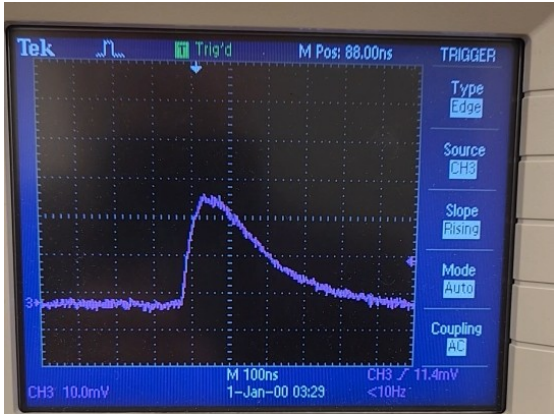
Pulse shape of a scintillating fiber matrix in LEAD (small piece of a GlueX detector prototype)-- poor optical contact

- Very fast rise time!
- Pulses are <400ns at the base

Currently aim is to further reduce the power consumption

1- Resisitive /passive first stage per SiPM pixel followed by a summing/amplification stage

- Low power consumption
- Decent timing properties
- Potentially prone to crosstalk between pixels



2 - Diode coupled first stage per SiPM pixel followed by a summing/amplification stage

- Low power consumption
- Decent timing properties
- Almost completely eliminates crosstalk between pixels