LED

LED

sipm

Preamp board

Hcal Tile

IH-1-38

Single pe spectrum

Sipm pulsed with LED
Vbias: -68.5V
(sipm #1545 from Hcal)

Low light / high gain

High Gain preamp output

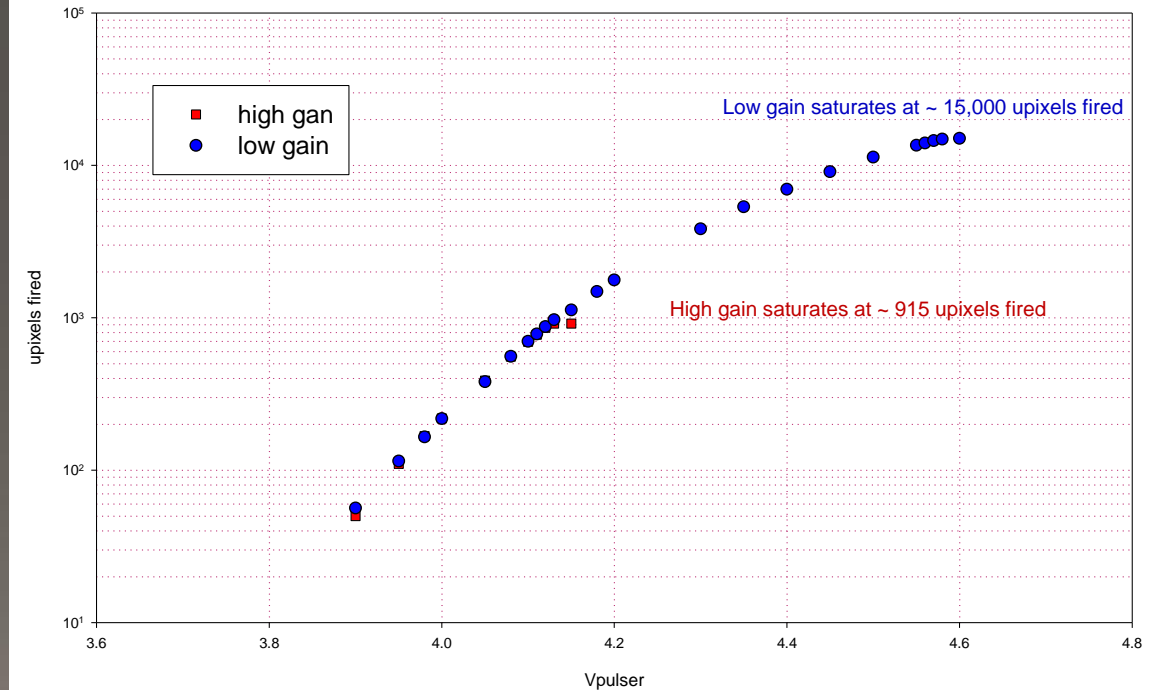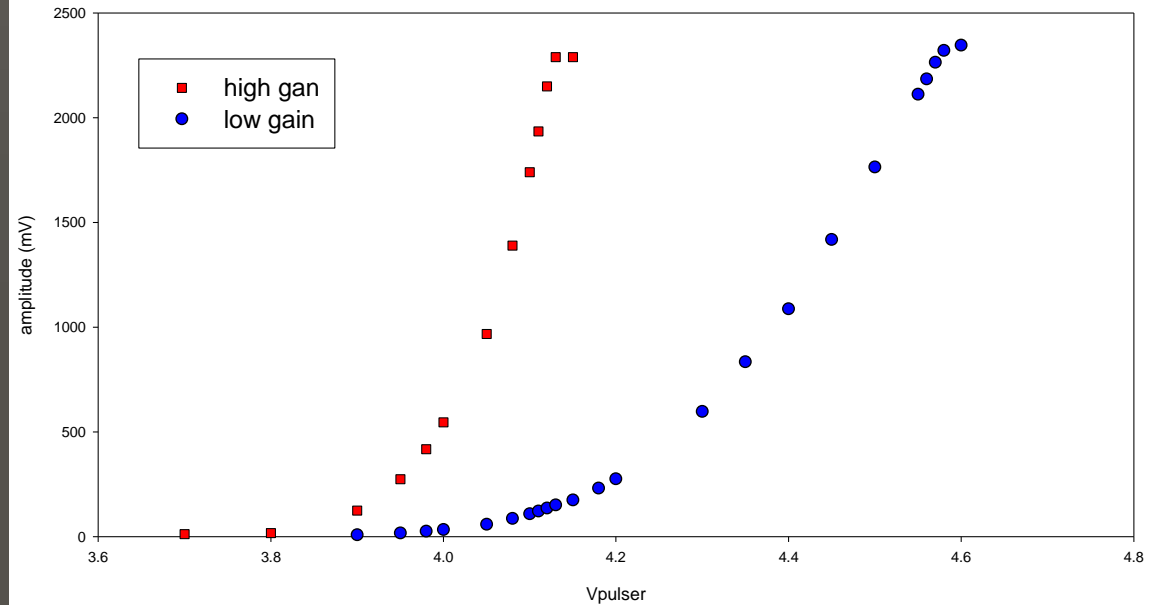20mV / 8 µpixel peaks = 2.5 mV / µpixel

Same setup

Sipm > preamp > oscilloscope

Measure signal amplitude vs LED pulse
Amplitude. "Vpulser" (V) is the amplitude of the pulse
used to pulse the LED.
Is it proportional to LED output pulse?

This is with one / five sipms connected
to the preamp.

Is the signal from 100 μpixels in 1 sipm =
 the sum signal of 20 μpixels in 5 sipms?

Geometric efficiencies:

1mm Fiber area = 0.785 mm²

X 2 = 1.57 mm²

Sipm µpixel density: 40,000 µpixels / 9 mm²
= 4,444 µpix / mm²

So, if fibers are butted up against sipm (no epoxy layer?) they would illuminate
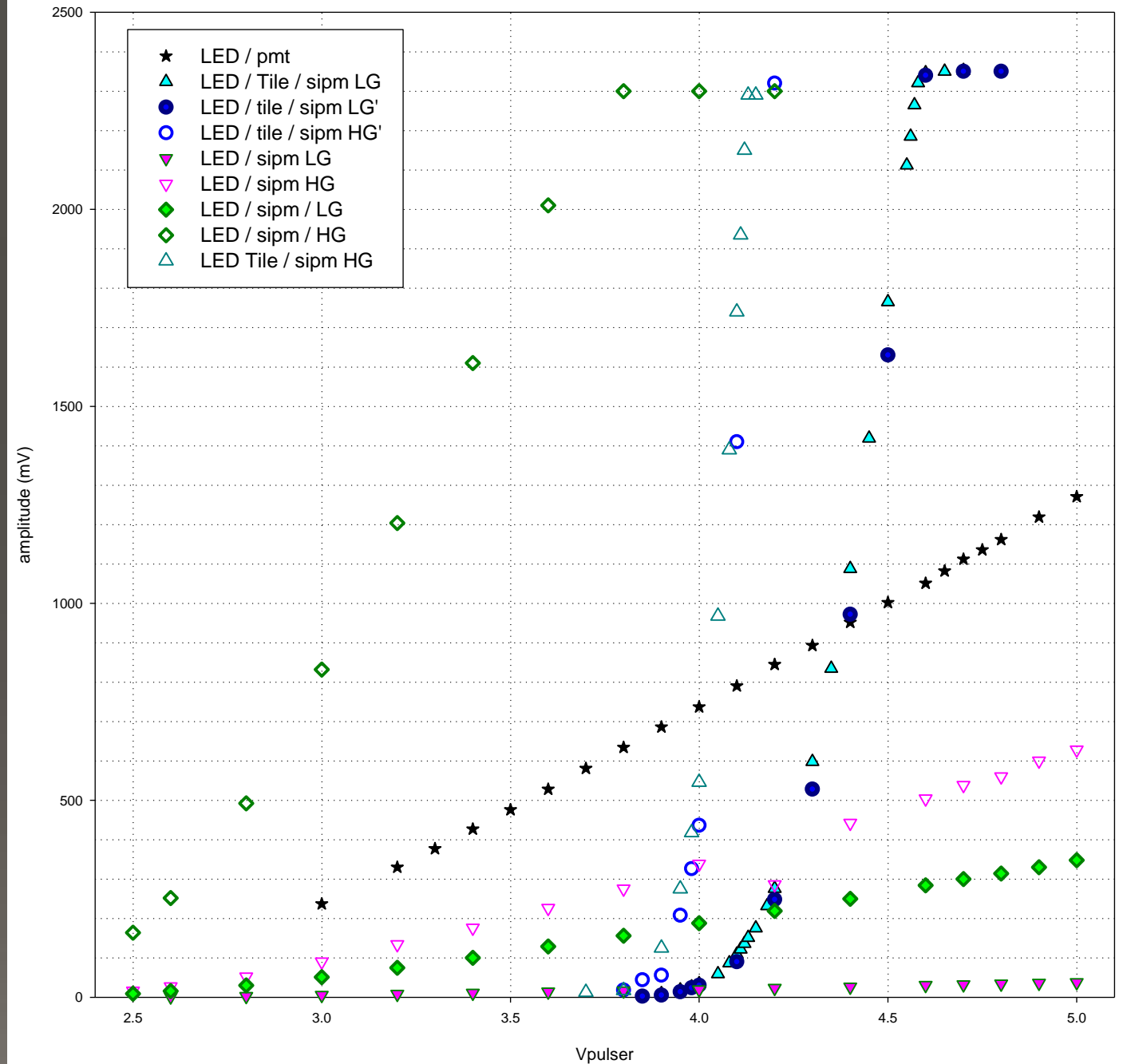
1.57 mm²   x   4,444   µpixels / mm²   =   6,978 µpixels

LED output vs Vpulser, measured with a pmt is linear over this range.

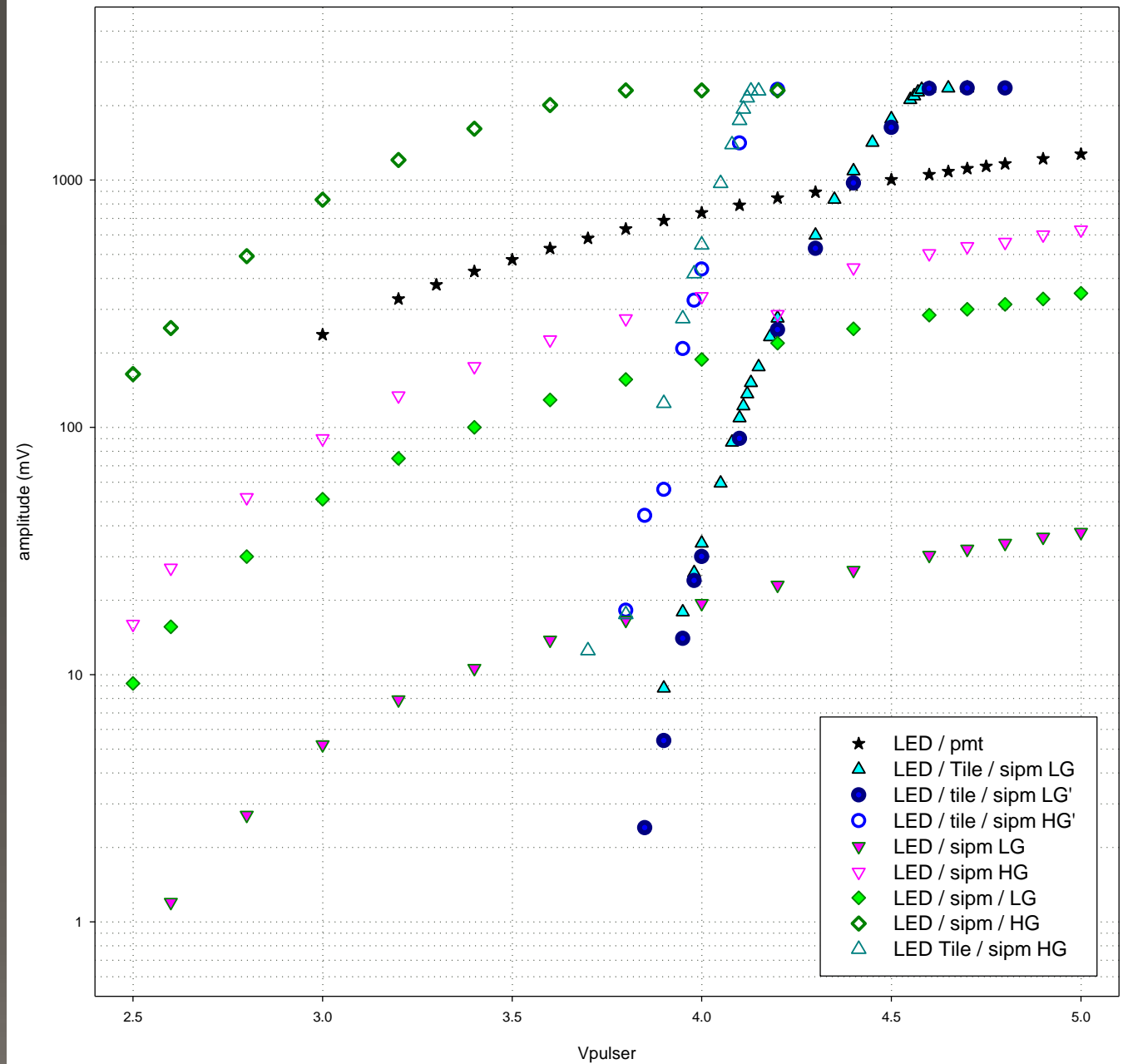LED measured directly with the sipm + preamp (no tile) also appears to be linear...

But the LED stimulated tile, read out with the sipm + preamp looks very different.
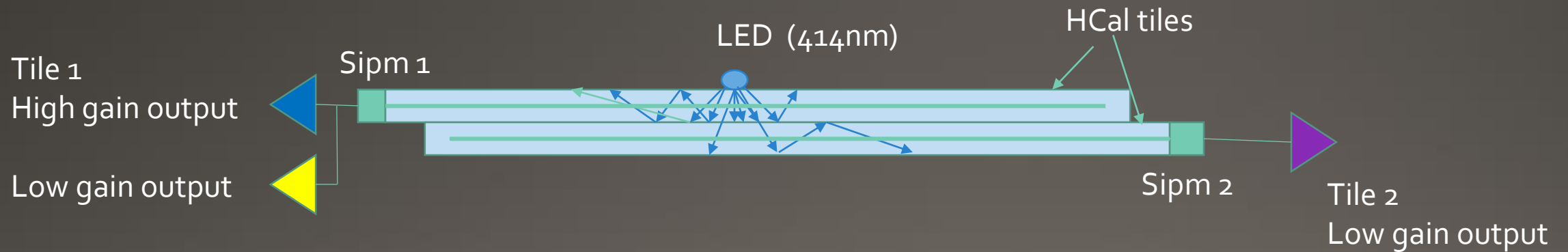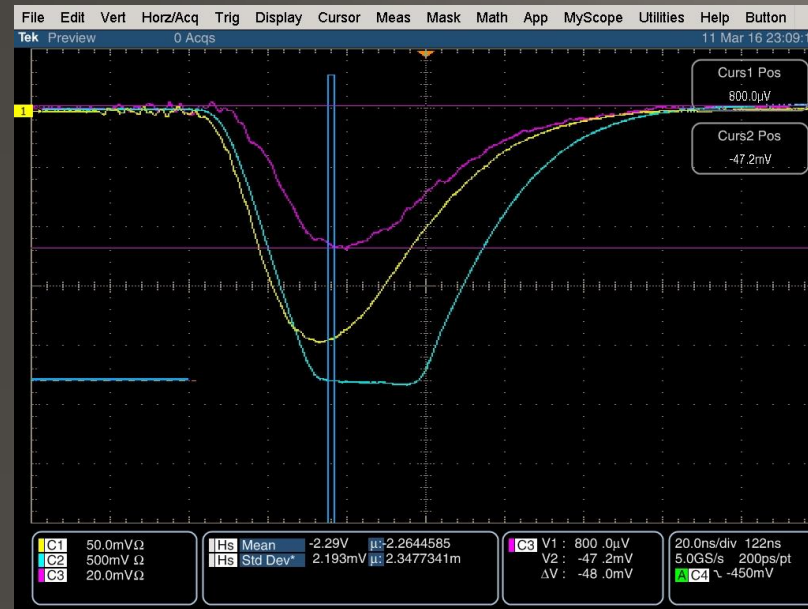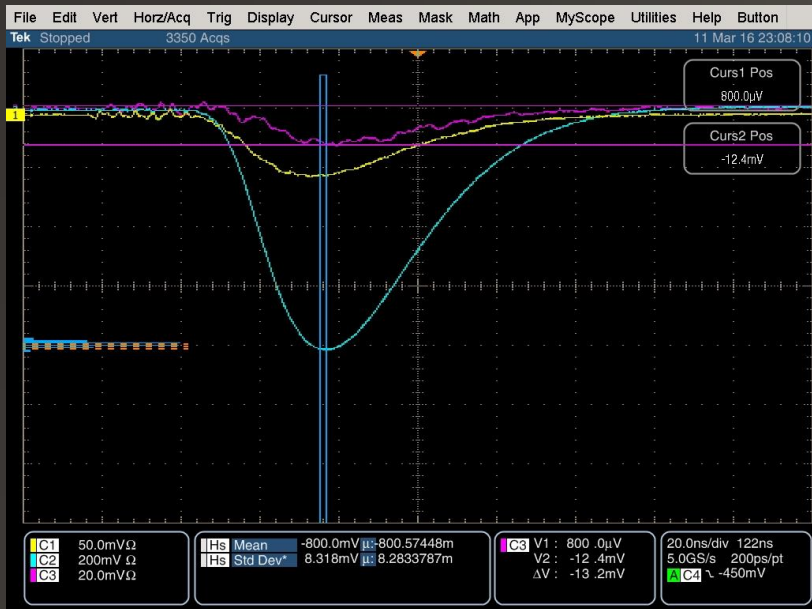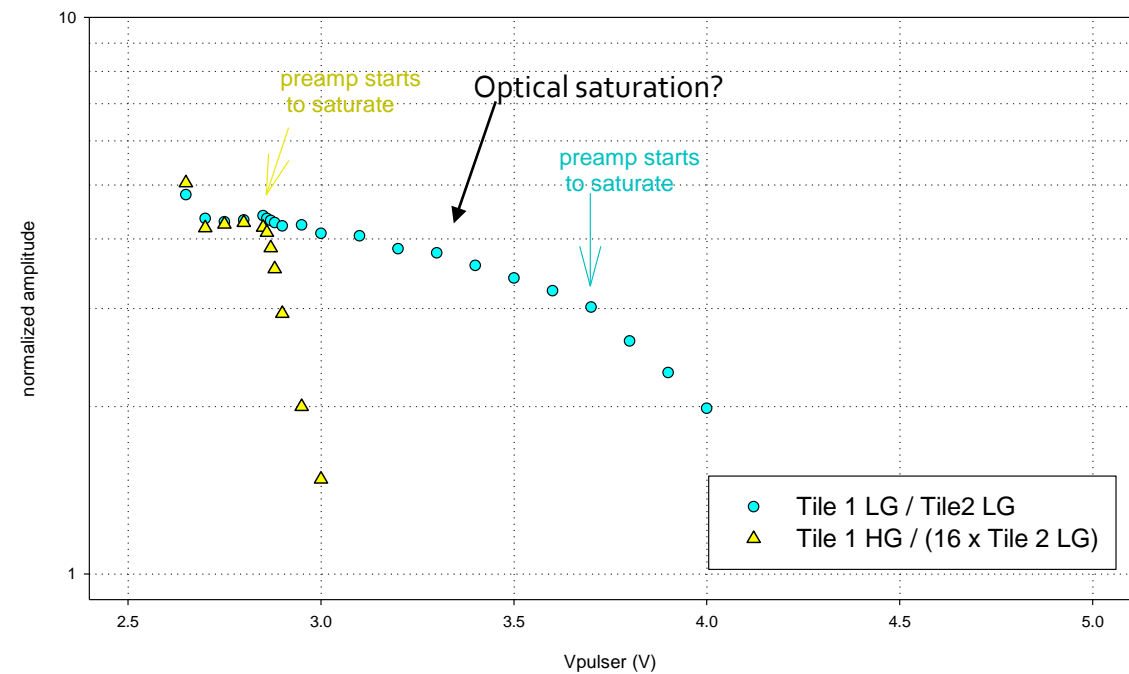
LED peak: 414nm
Pmt gain: 2 x 10^6

Same plot – log scale

LED (414nm)

HCal tiles

Tile 1
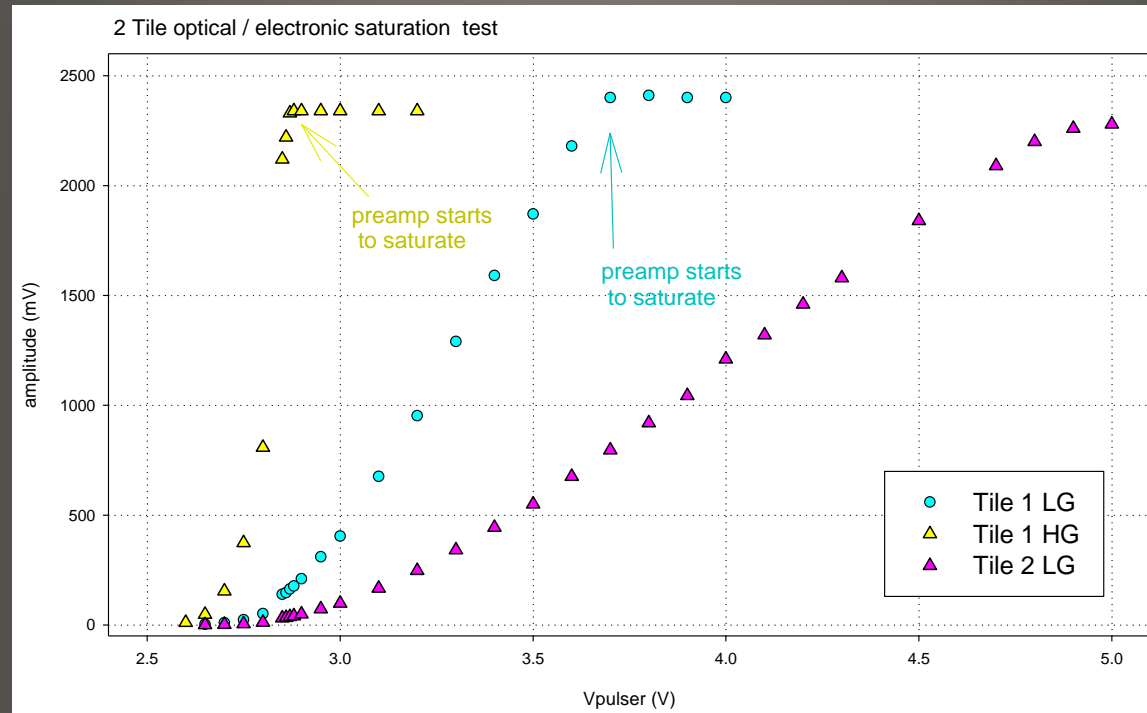High gain output

Sipm 1

Low gain output

Sipm 2

Tile 2
Low gain output

414 nm LED

Repeat previous measurement,
 but with a 365 nm LED to excite the
Scintillator, not just the WLS fiber.

2 Tile optical / electronic saturation test: 365nm LED