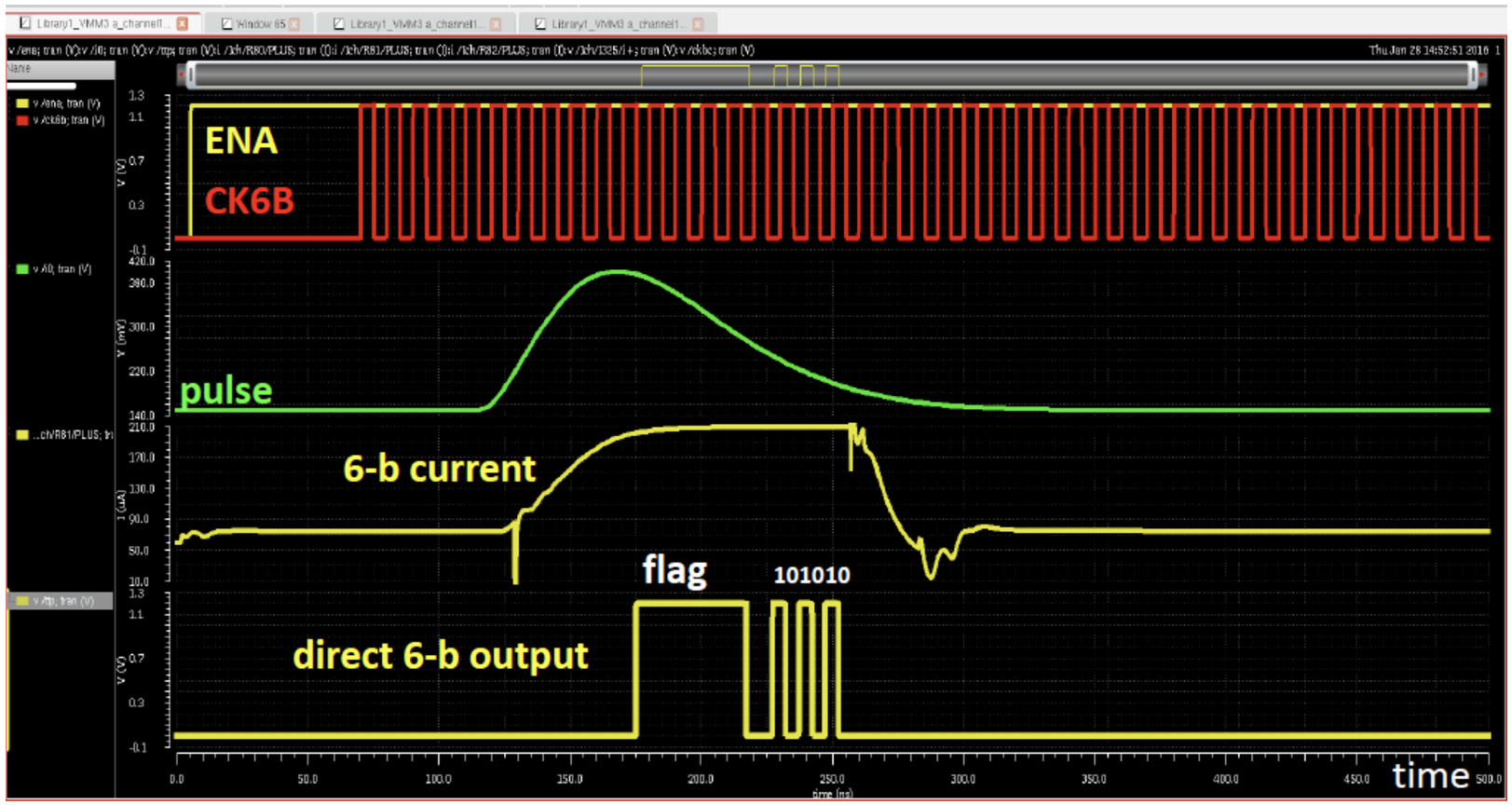
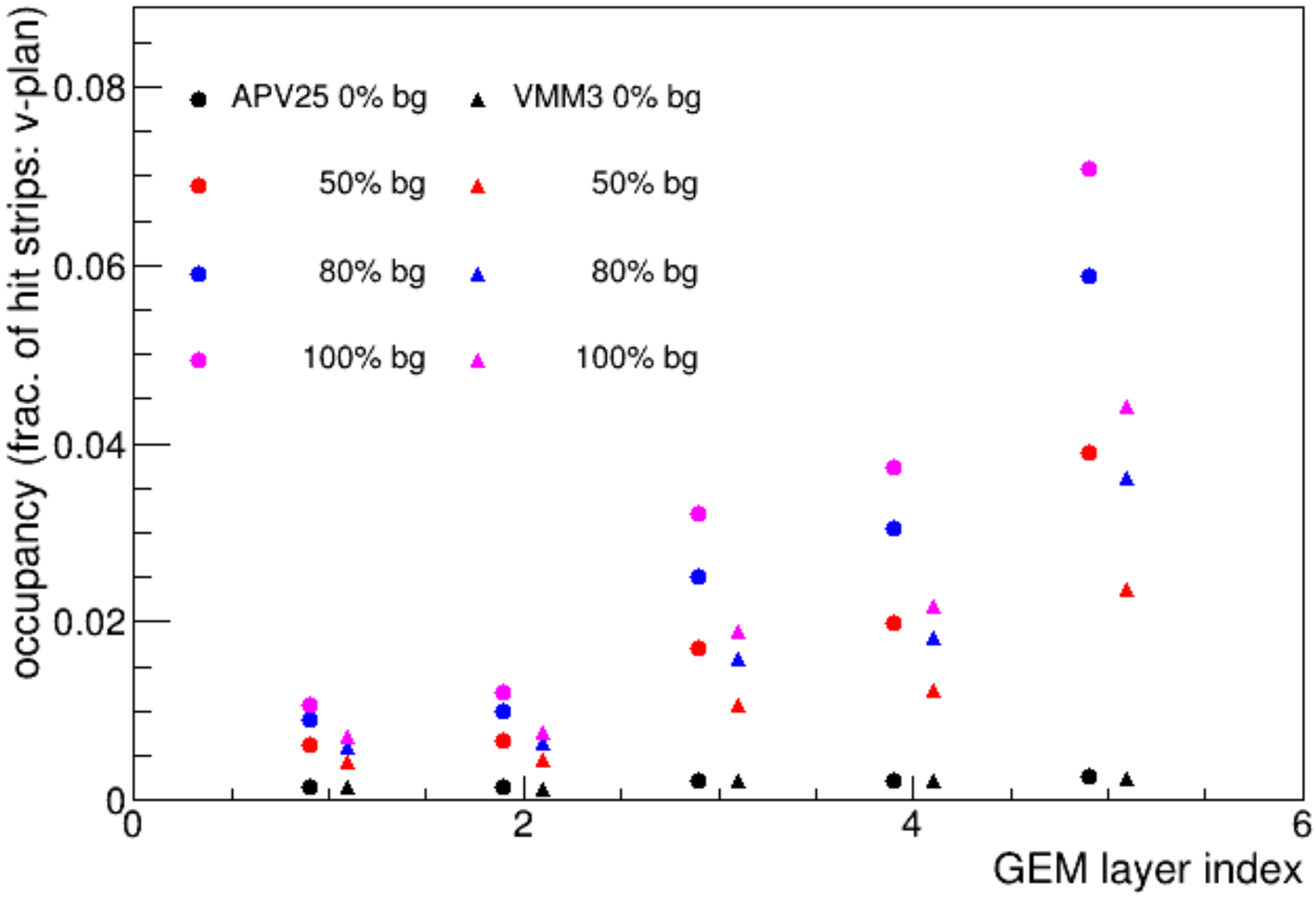
VMM3 6-bit ADC



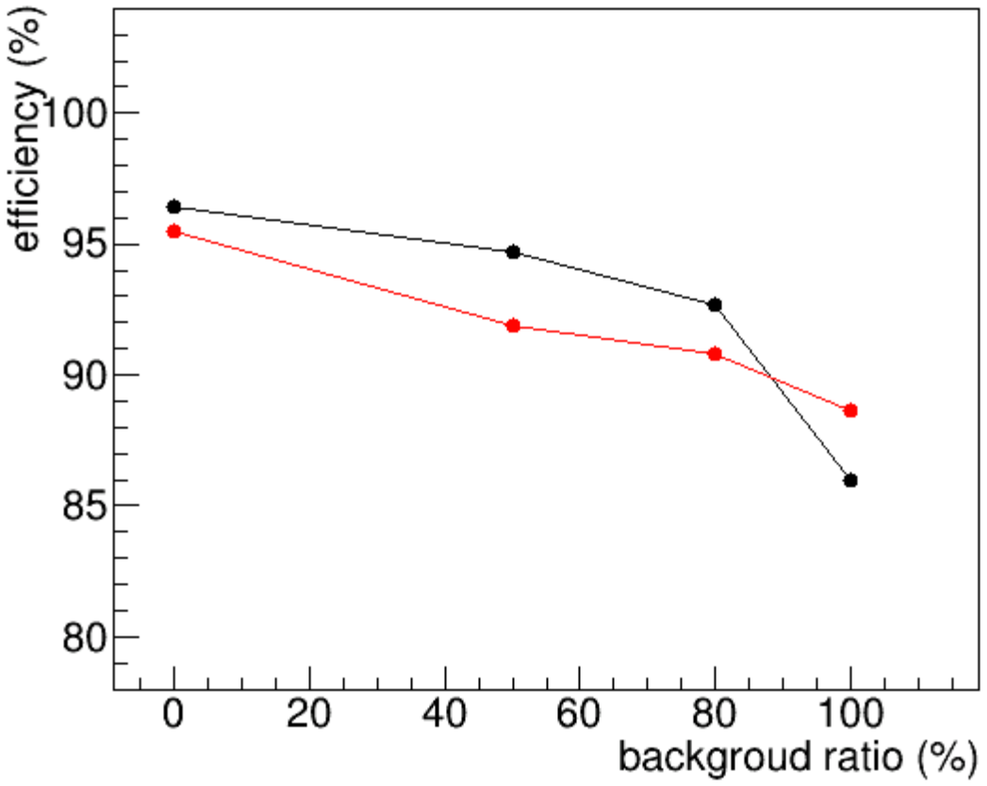
- one output per channel
- flag at peak followed by 6-bit ADC amplitude
- Keep reseting it self until being enabled by trigger signal (ENA)
- No contribution from ‘hits’ before trigger and after peak found; this will significantly

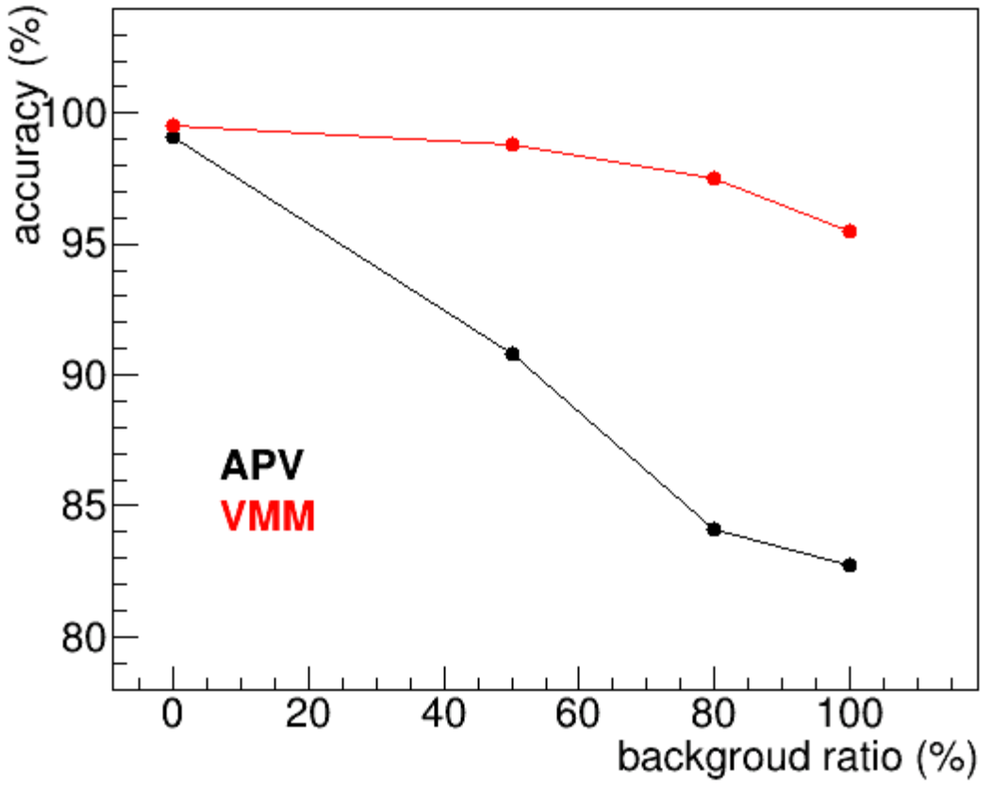
Occupancy comparison



- High occupancy is one of main issue impact the tracking efficiency and accuracy
- VMM3 have ~40% lower occupancy than APV25 (3 sample, check pulse shape)

Background Sensitivity

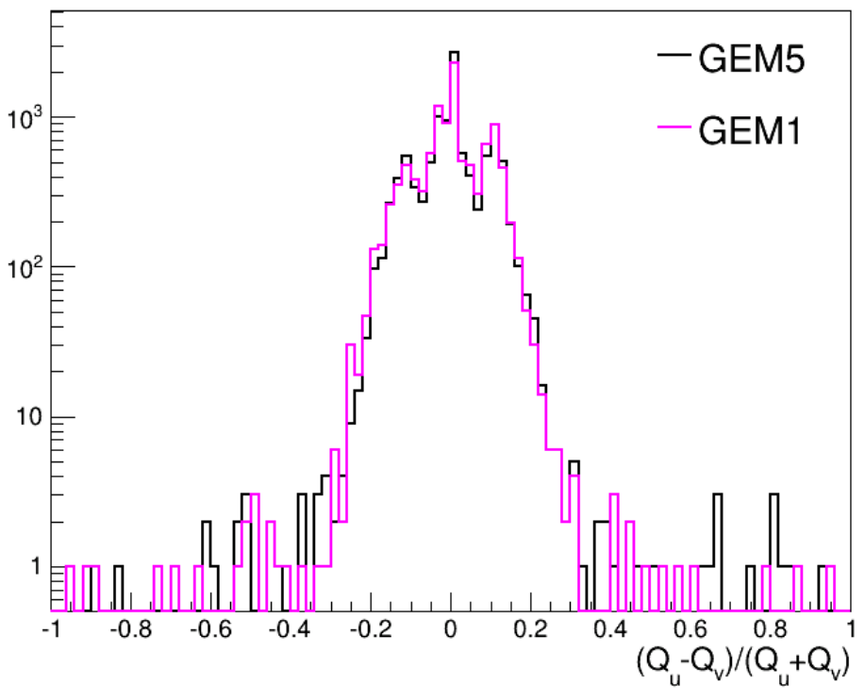


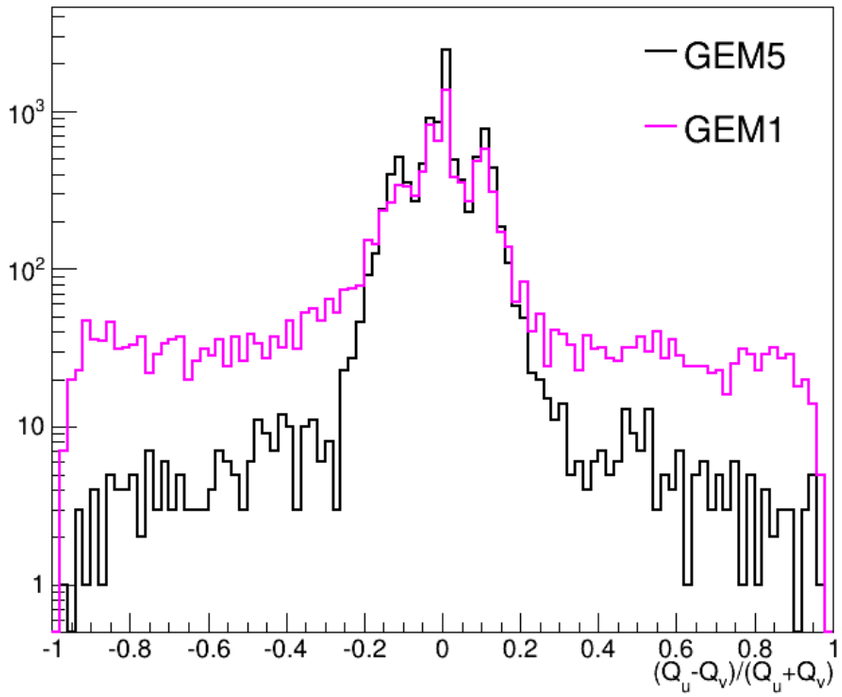


- Absolute values for VMM not finalized yet.
- VMM ***less*** sensitive to background ratio (luminosity) than VMM

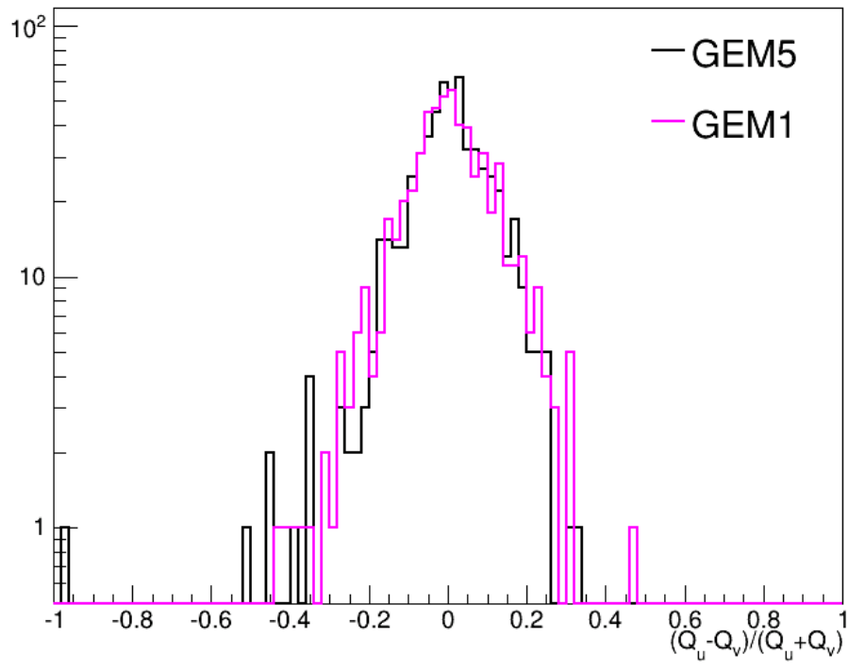
Charge asymmetry

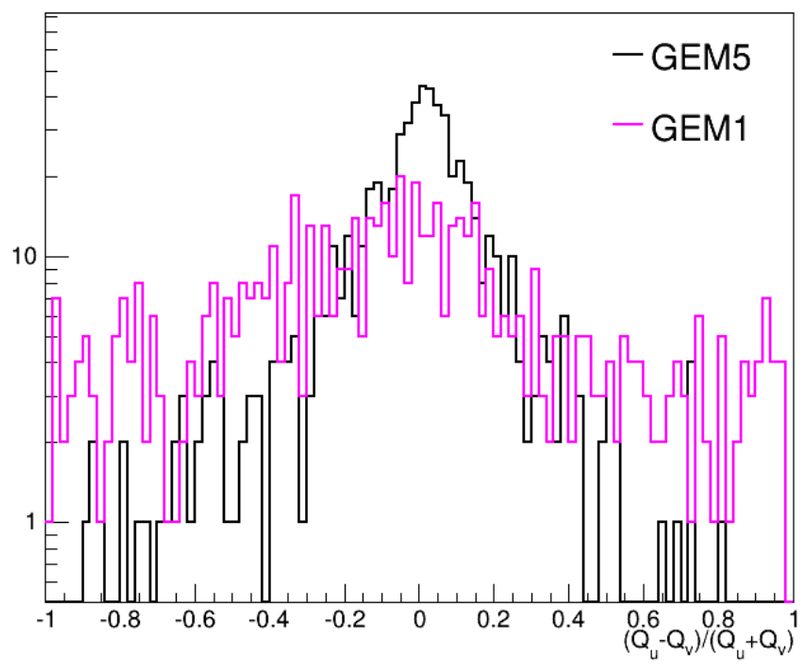
VMM



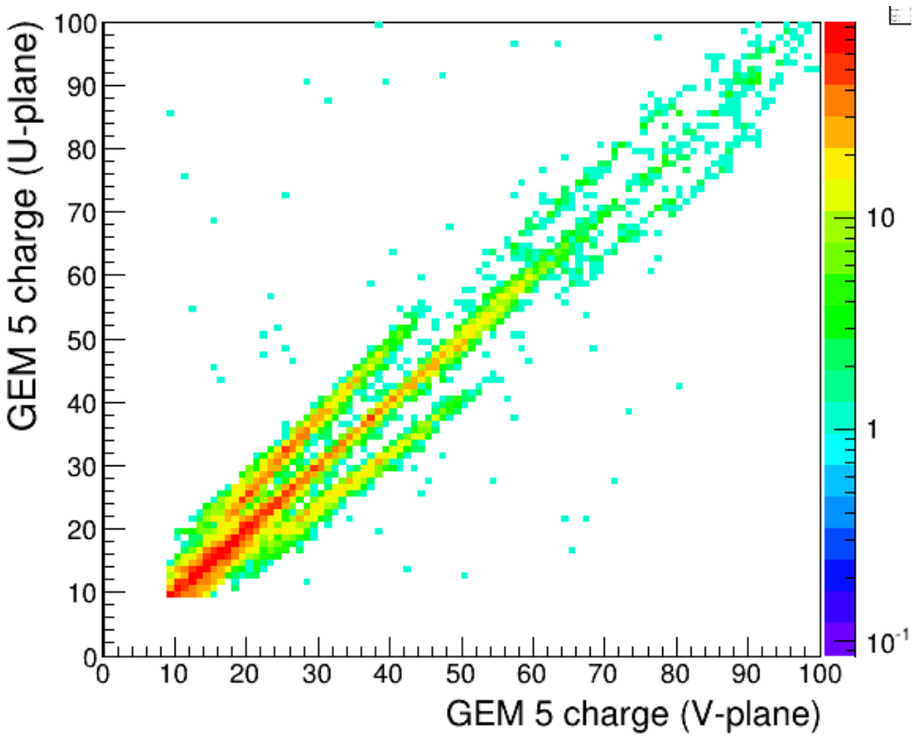


APV

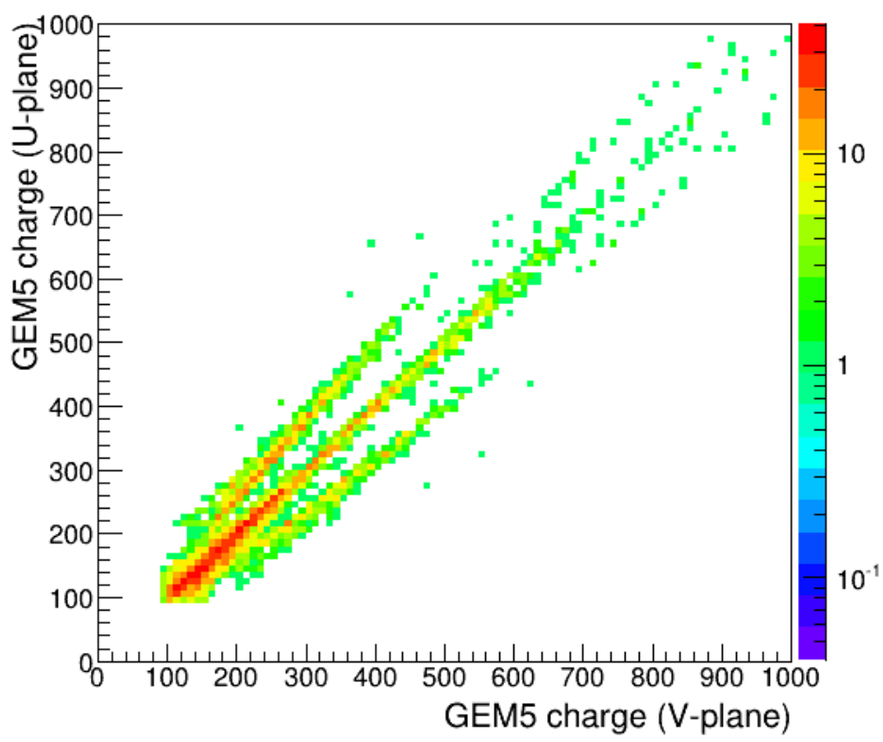




Why multi peaks?

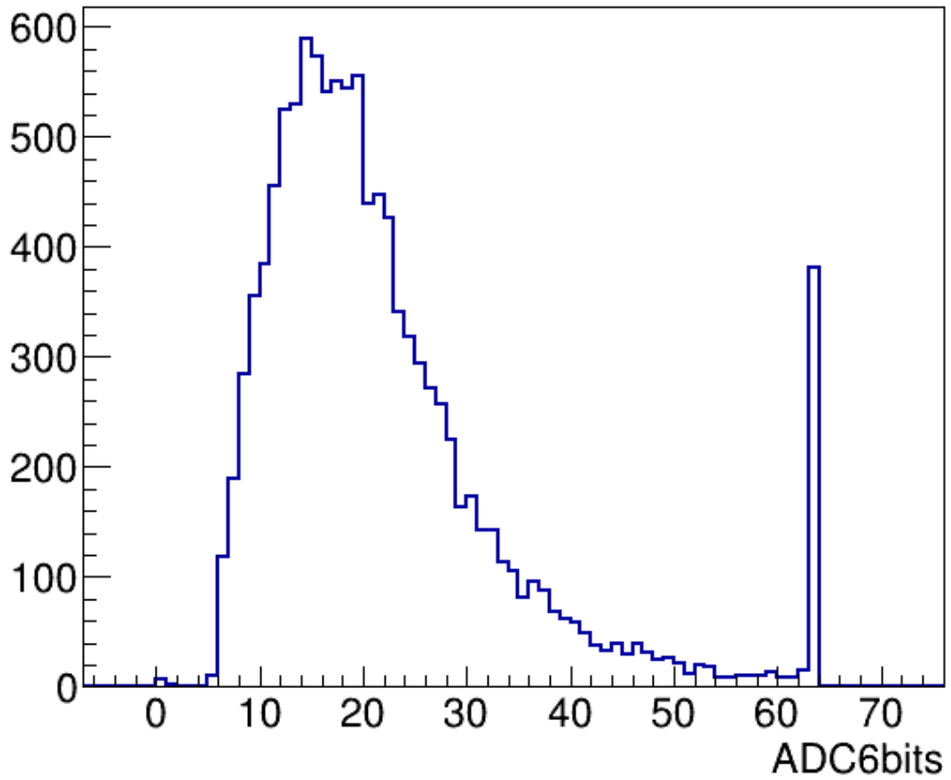


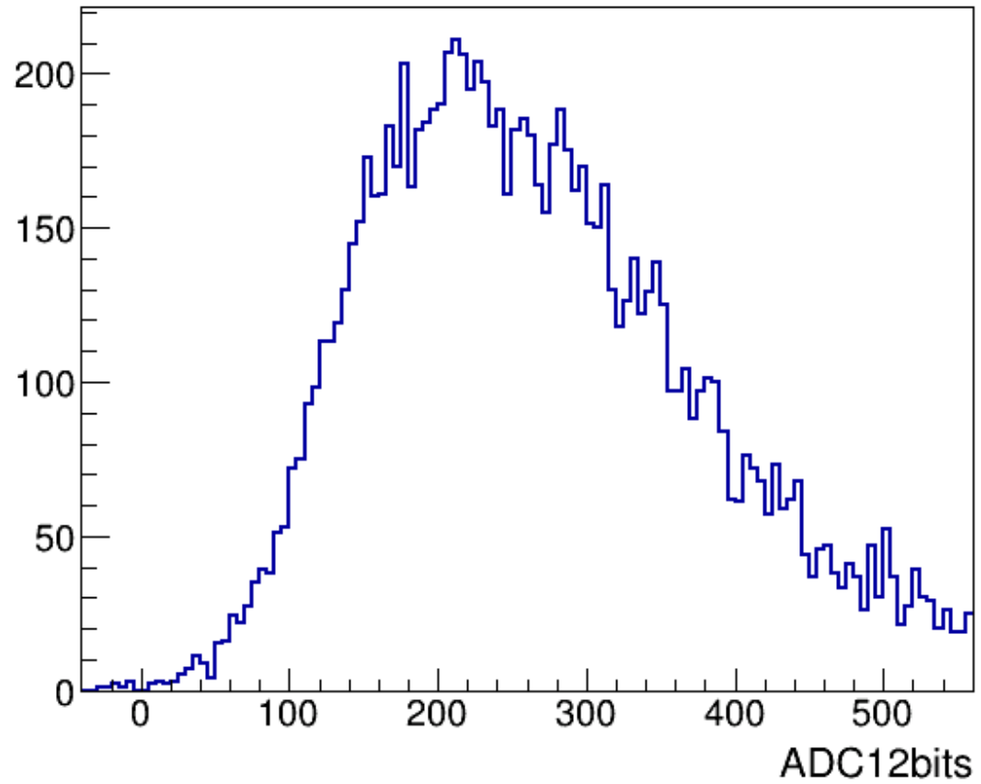
6 bits



12 bits

ADC





Long tails are cut off

- For 6 bits ADC, is this gain acceptable?

To-do

- How to simulate noise for VMM3?

3. Detector Performance with the VMM3

The VMM3 was tested with two $10\times10\,cm^2$ resistive strip micromegas prototypes[3] with 1D readout at CERN. The strip pitch of those detectors is $400\,\mu m$ and the capacitance is $\sim30\,pF$. They were operated with the drift high voltage at -300 V and an amplification high voltage, applied to the resistive strips, of 545 V while the mesh was kept to the ground. The gas mixture used was Ar+7%CO_2. The drift gap is 5 mm while the amplification gap is kept at 128 μm above the resistive strip[4].

The noise[5] of the VMM3 was measured on the monitoring output of the VMM with an oscilloscope while the board was mounted on the detector or being on the bench. The measurement was converted to equivalent noise charge (ENC). Figure 3 shows the noise levels of the VMM3 as a function of the electronics gain (left) and the setup of two micromegas detectors on the testbeam at CERN (right). It should be mentioned that the measured noise is very close to the intrinsic noise of the ASIC.