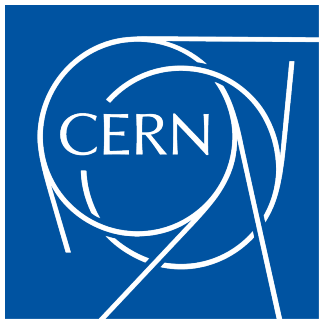
^{90}Sr measurement of 8×8 mm^2 APD

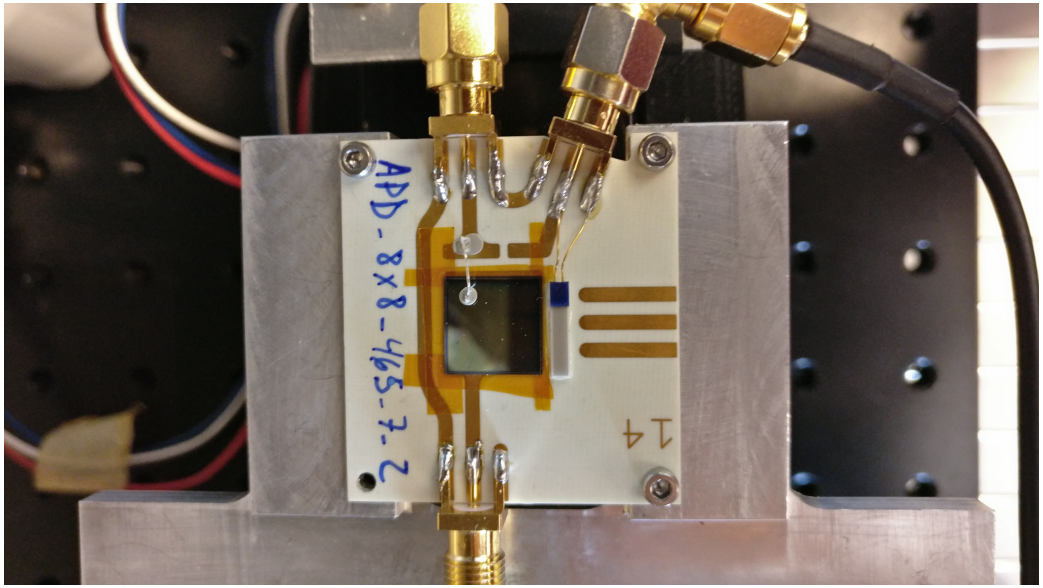
CERN SSD group

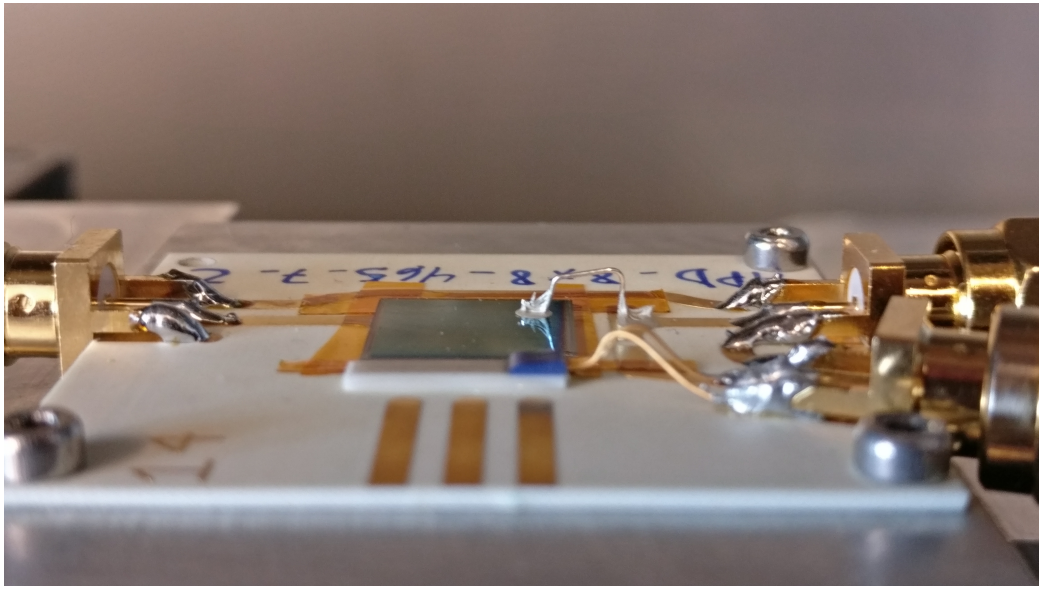
17.01.2017



Mounting

Mounted two unpackaged 8 $\times$ 8 mm^2 APDs on ceramic PCBs

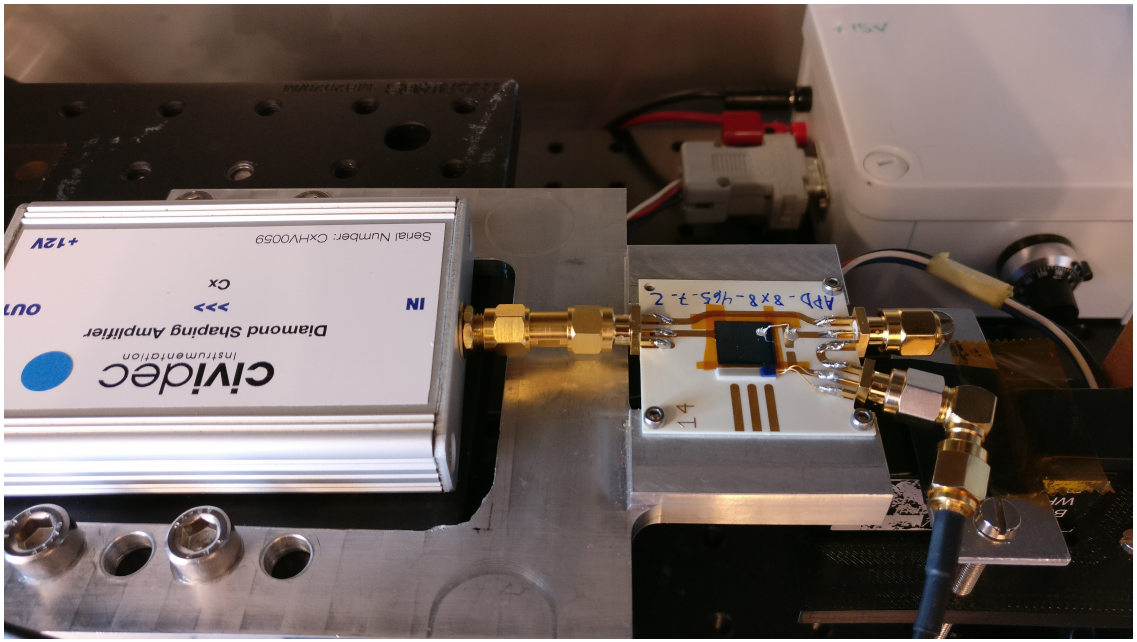


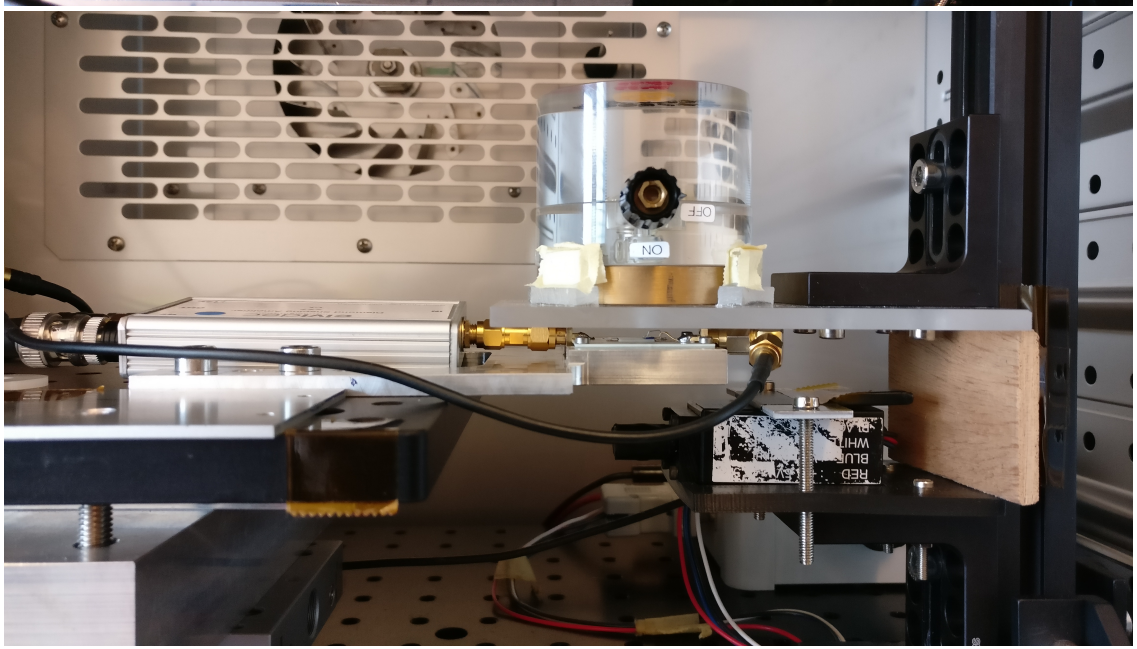


- Ceramic PCB
- Pt 1000 thermometer
- Hole under the sensor to reduce material
- Backside contact: silver paint
- Front contact: silver paint and wire
- Kapton tape at the edges and under the polyamide passivation
- Sample biased to 1800 V

One APD damaged due to arching. (Different PCB and Kapton configuration)

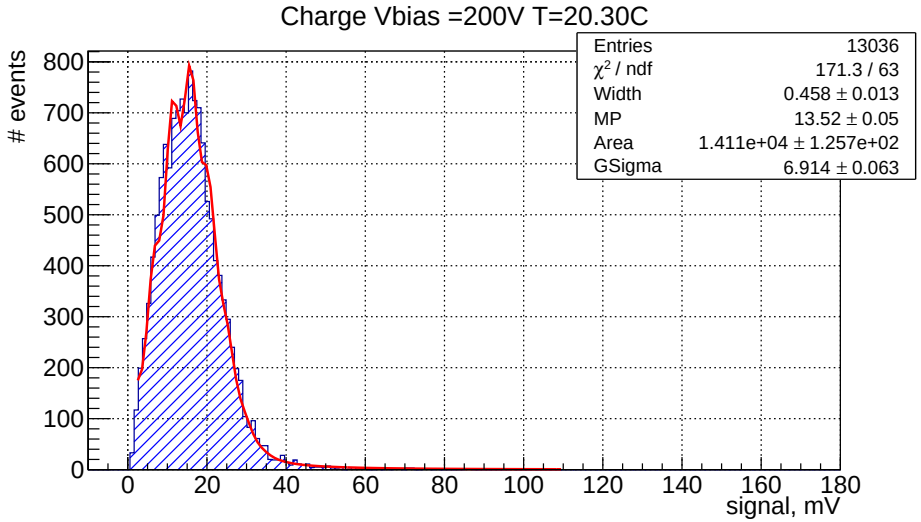
Setup

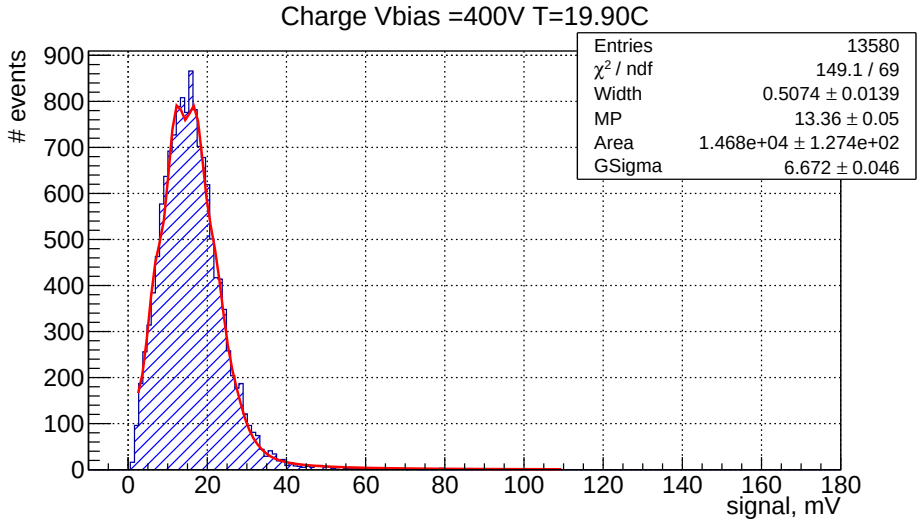


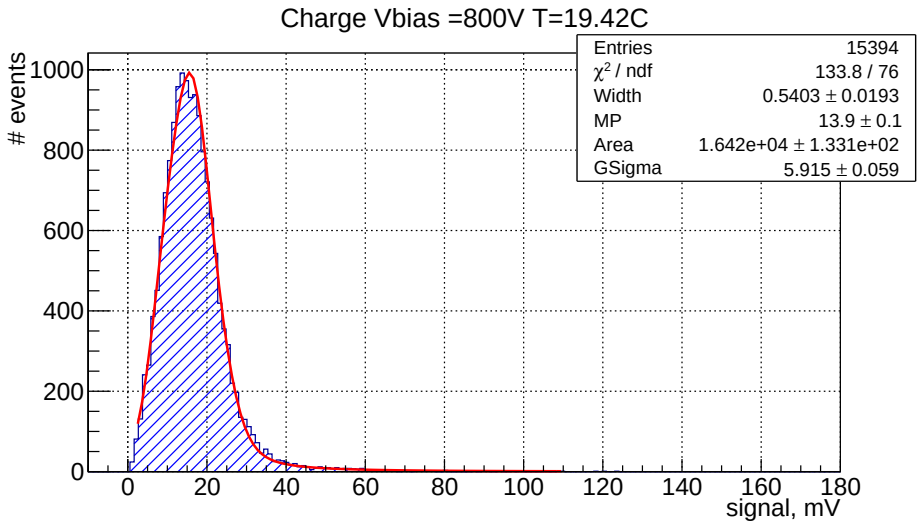


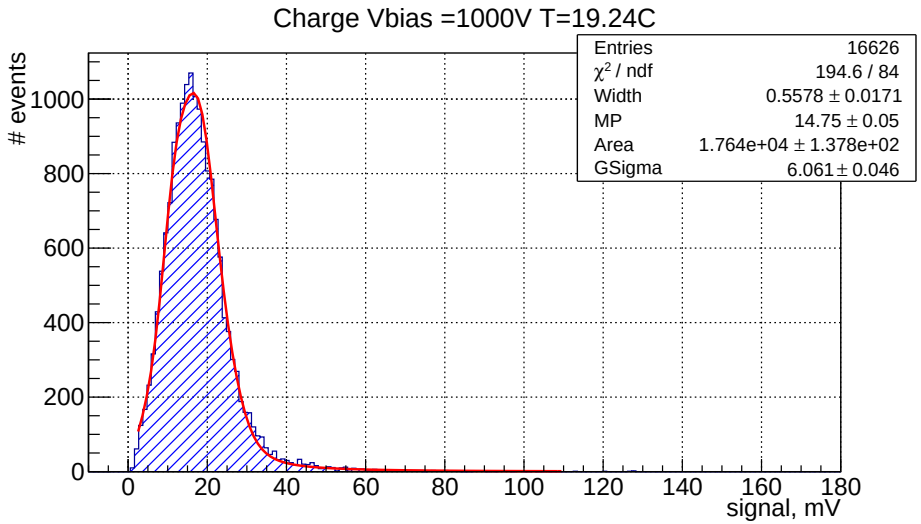
- Charge sensitive amplifier
- Backside bias and readout
- HV through amplifier ($V \leq 1000$V)
- ^{90}Sr source
- Brass collimator
- Trigger scintillator
- Pulse digitization using scope

Charge Distributions



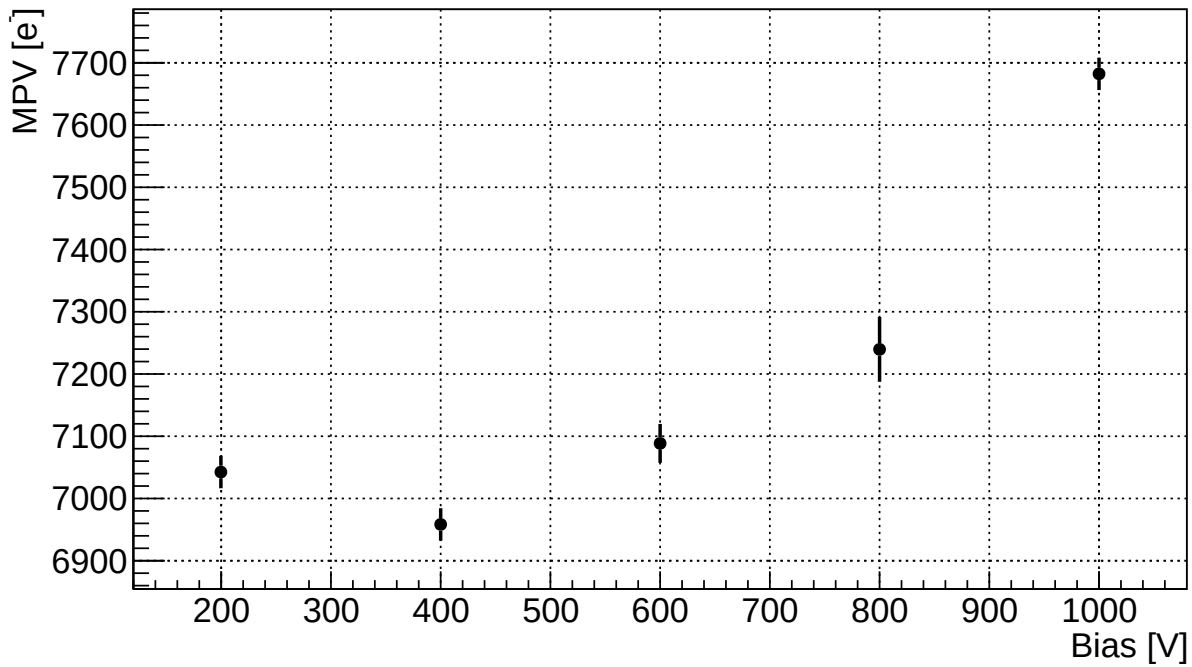






- Signal distribution described using Landau-Gauss convolution
- Strange structures at the peak for lower voltages, probably due to convolution implementation

Landau MPV vs Bias



- Calibration from amplifier manufacturer (Cividec) website
- Landau MPV increases with bias and is close to the expectation for $\approx 100\mu$m active thickness at 1000 V
- Not clear what happens at 200 V. Fit problem?

Summary & Outlook

- Gained some experience in mounting APDs
- Performed first measurements ^{90}Sr of 8×8 mm^2 APD

- Go to higher bias voltages
- Develop better solutions for mounting (metal deposition for wire-bonding)
- Perform TCT measurements (investigate depletion region shape, uniformity, etc.)

Backup Material