

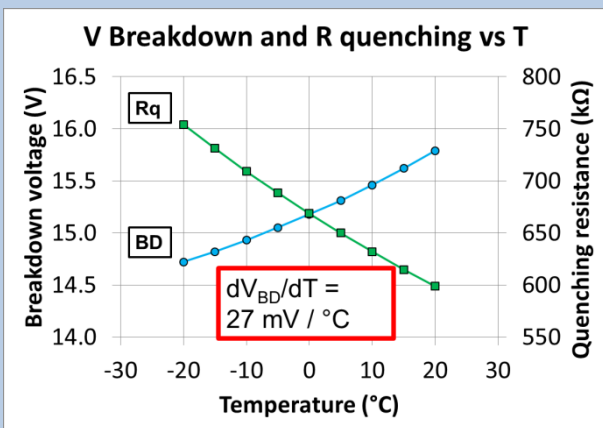
# First results on NUV-SiPMs at FBK

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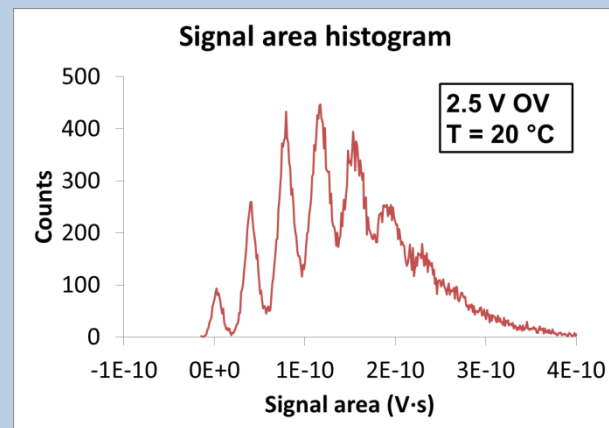
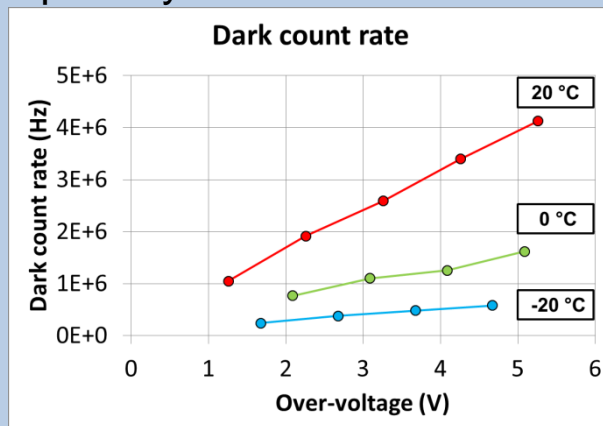
We show selected results on the first release of **Near Ultra Violet SiPM technology (NUV-SiPM)** produced at FBK. The PDE in the near-UV part of the light spectrum is mainly limited by the quantum efficiency term since the photo-generation takes place in a very shallow region of the silicon. Thus, besides using a p+-on-n junction configuration to have an avalanche triggered by the electrons, we need to implement a very shallow p+ layer.

## Functional measurements on 1x1 mm<sup>2</sup> 50 μm cell NUV SiPM



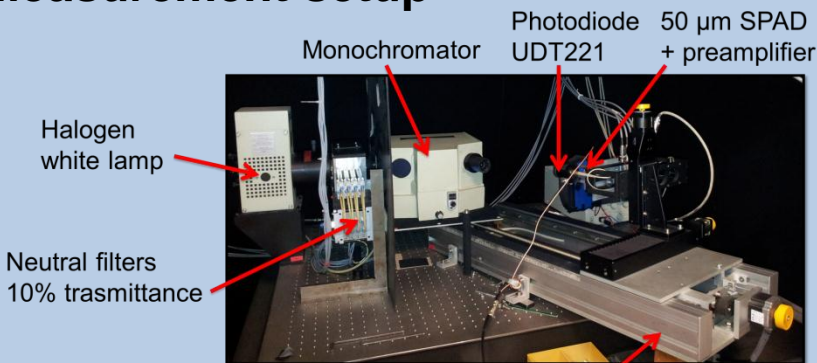
→ Low breakdown voltage  
T dependence

→ still relatively high  
primary dark count



→ good single cell  
response uniformity  
(peak resolution mainly  
limited by electronic noise)

## Measurement setup

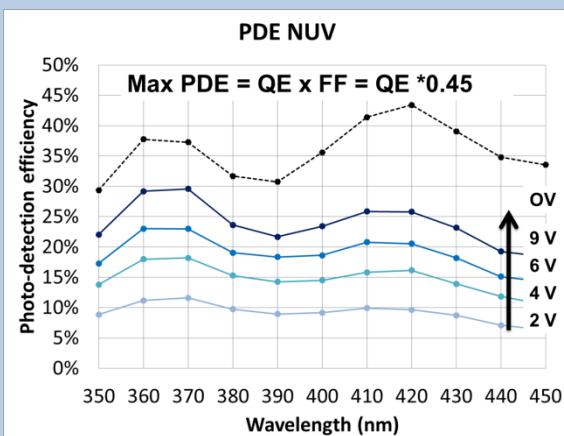


Stage with 3D precision movement (50  $\mu\text{m}$  step)

A SPAD (with same SiPM cell layout) is used to have lower noise and eliminate any cross-talk.

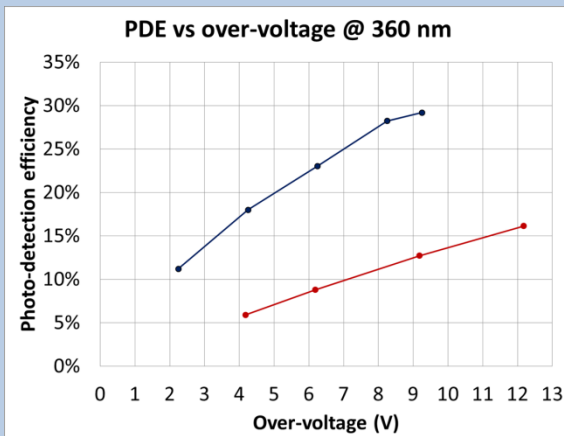
Pulse rate is extracted from the histogram of the time difference between consecutive pulses. Only events falling on Poisson statistic are counted to eliminate after-pulse contribution!!

## NUV SiPM PDE and comparison with n-on-p technology



QE measured on test photo-diode allows us to evaluate max PDE (higher plot).

**PDE=30% is measured at 360 nm, 9 V OV.**



In NUV SiPM PDE increases faster with OV w.r.t STD since the avalanche is triggered by electrons instead of holes.

**Conclusions:** We presented the first results of the NUV-SiPM produced at FBK. The functional measurements on a  $1 \times 1 \text{ mm}^2$   $50 \times 50 \mu\text{m}^2$  SiPM show that the device is working properly. The optical characterization of a SPAD with the same cell structure of the SiPM evidences a PDE as high as 30% at 360nm and 9 V over-voltage which is a rather good value considering a  $FF=45\%$ . We are currently working to improve the noise and after-pulse performance of this new technology.