

# **Herd PSD italian meeting**

## **SiPM characterization**

**20<sup>th</sup> February 2020**

**Pavia group**

# SiPM IV curves

The first step in characterizing SiPM is measuring the IV curves.

From those measurement we must adopt a objective and automatized approach to measure the BreakDown (BV) voltage for each SiPM.

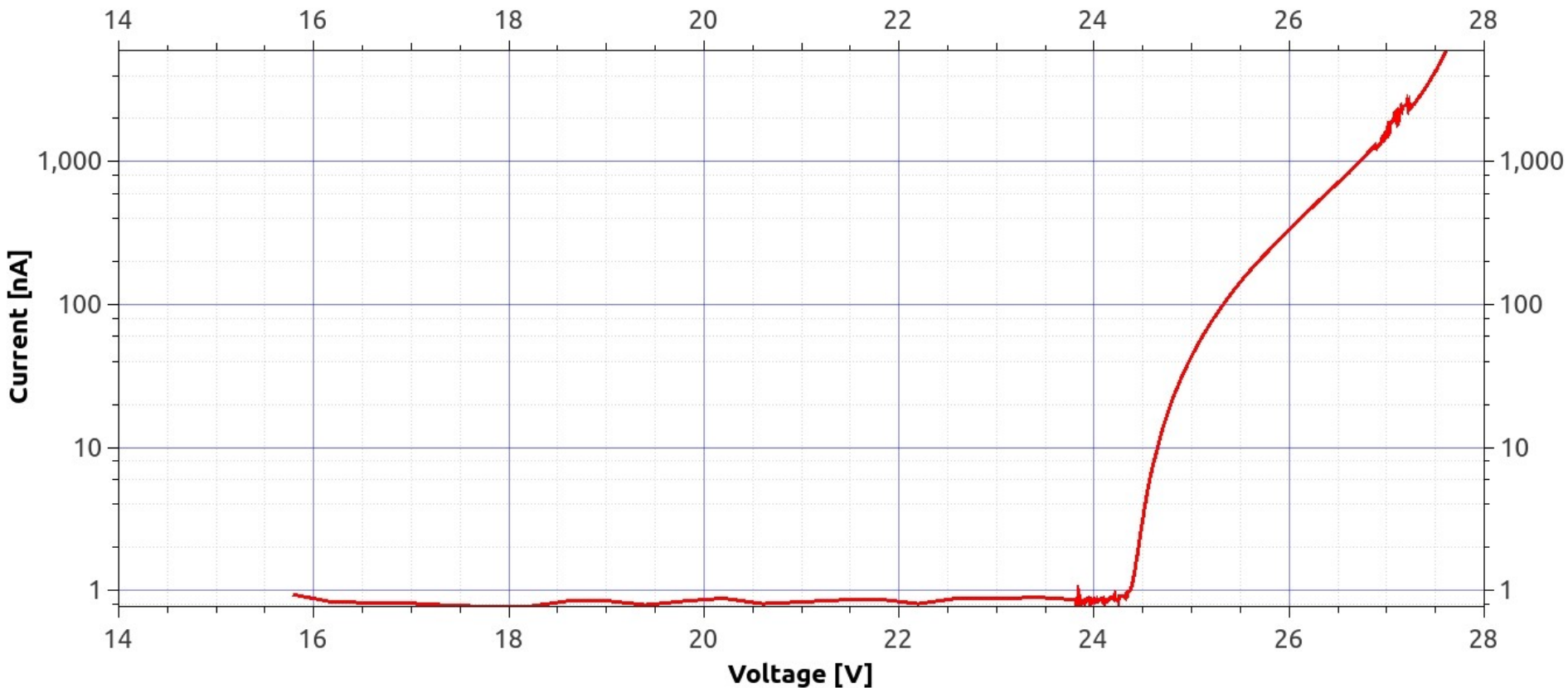
After taking IV curves, the curves are smoothed by a program implementing Locally Estimated Scatterplot Smoothing (LOESS).

Then we calculate the second logarithmic derivative and select the maximum as the BV (M.Simonetta et al., Test and characterization of SiPMs for the MEGII high resolution Timing Counter, NIMA 824, 145-147 (2016)).

The programs in C++ are available as libraries.

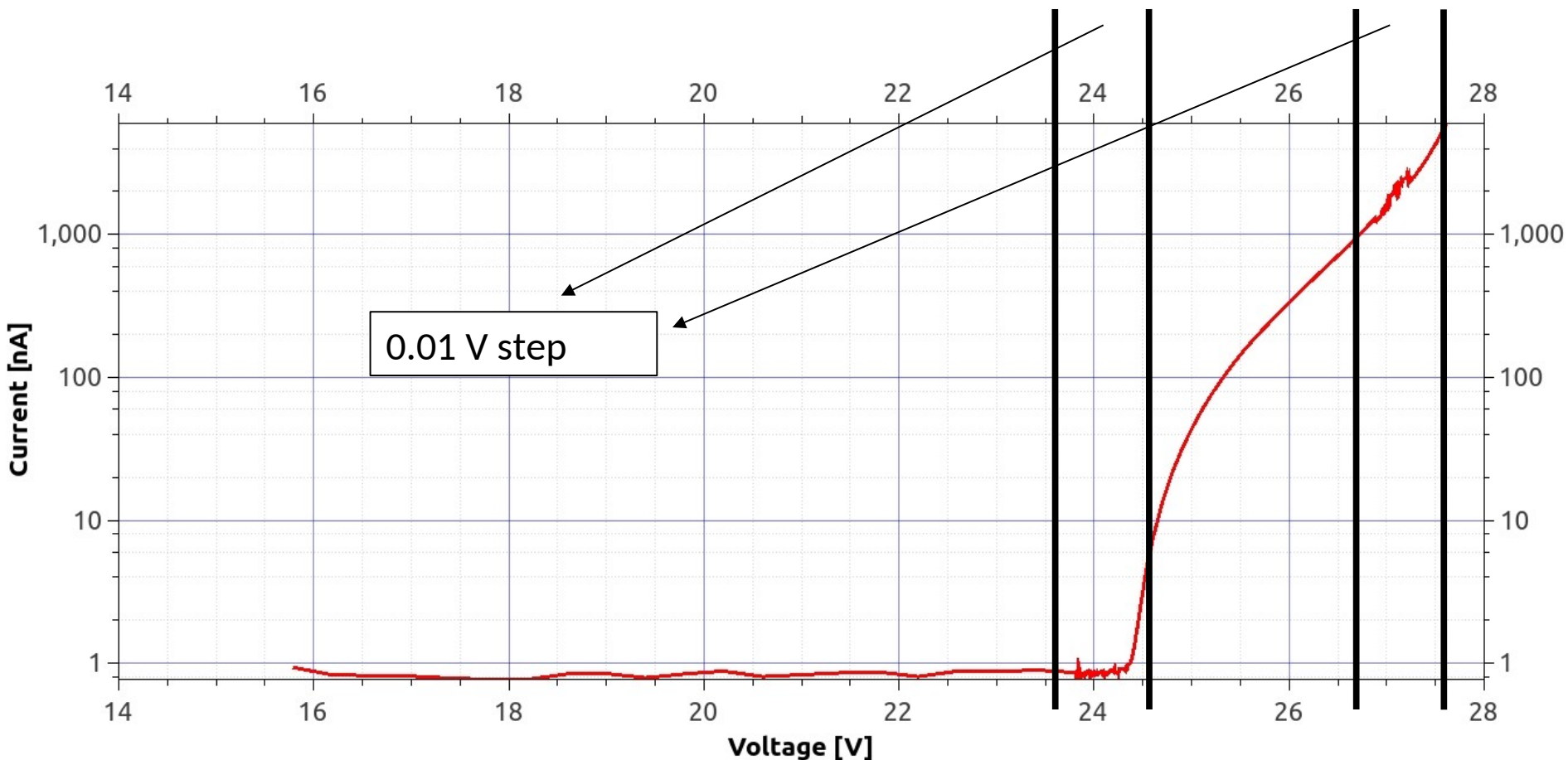
# Breakdown Voltages measurements

- different samples steps in different regions to speed up measurement
- smoothing
- maximum of the second logarithmic derivative



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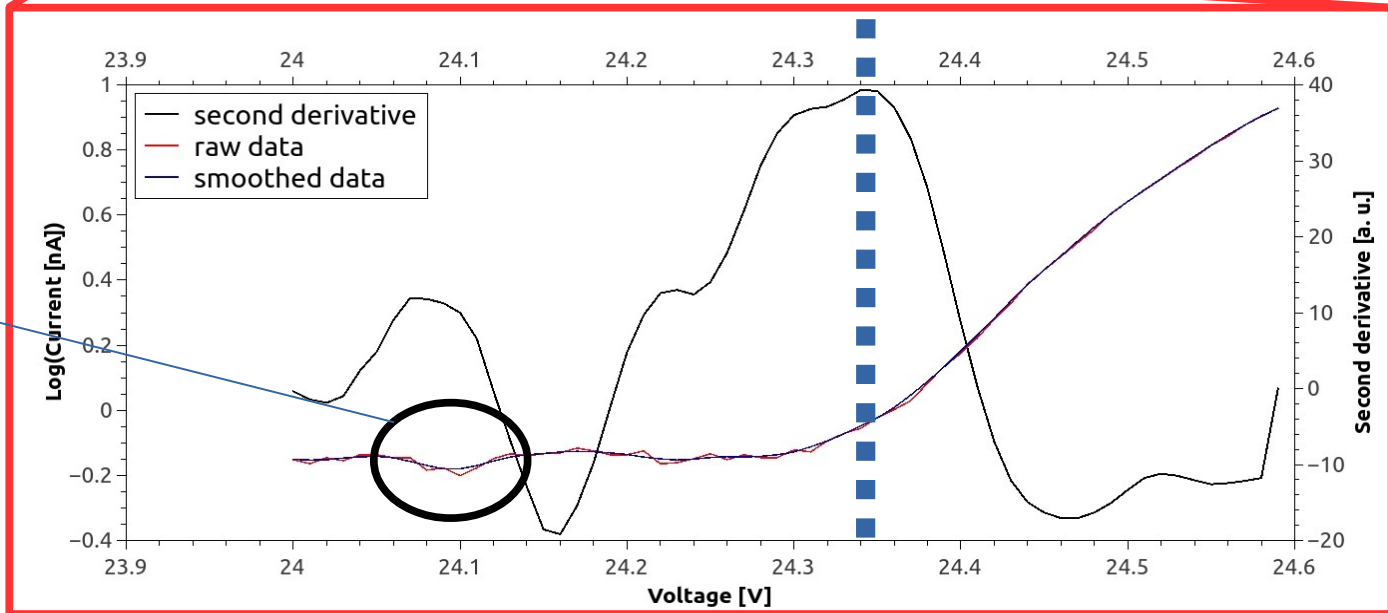


# Breakdown Voltages measurements

- This algorithm avoid to be affected by SiPM currents fluctuations



**BREAKDOWN  
VOLTAGE**

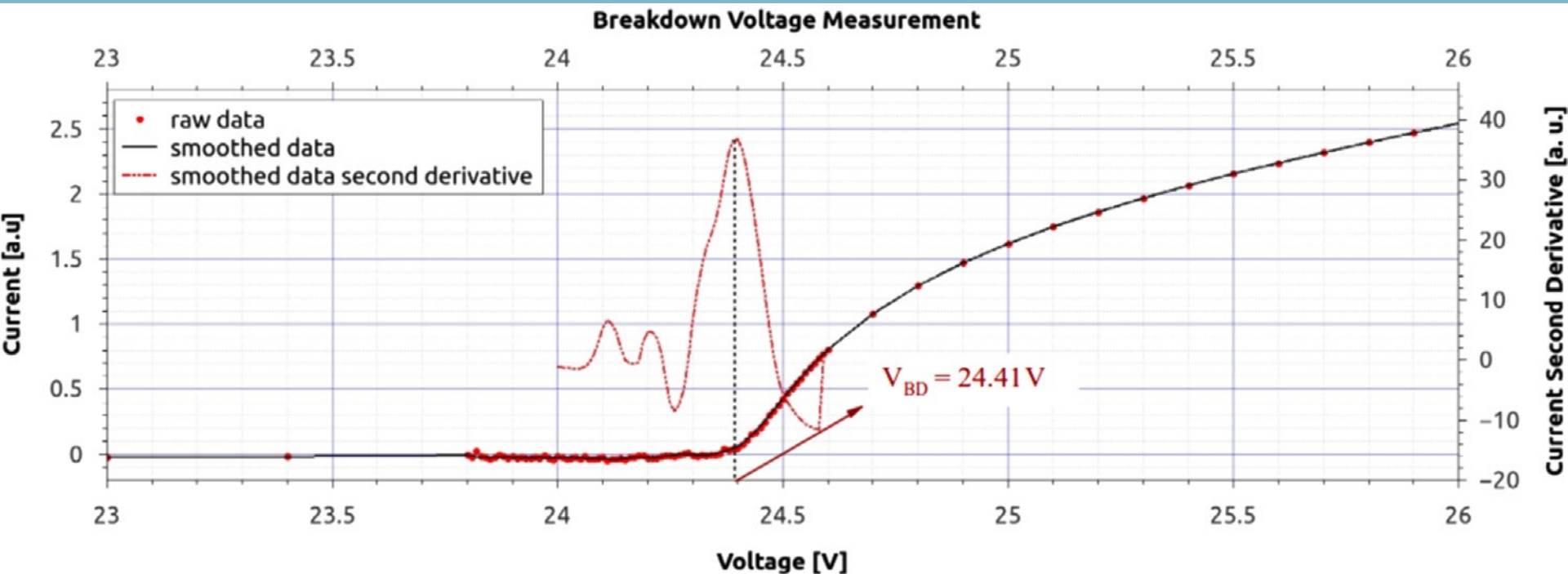


Original high second derivative is now smoothed

# BV from IV

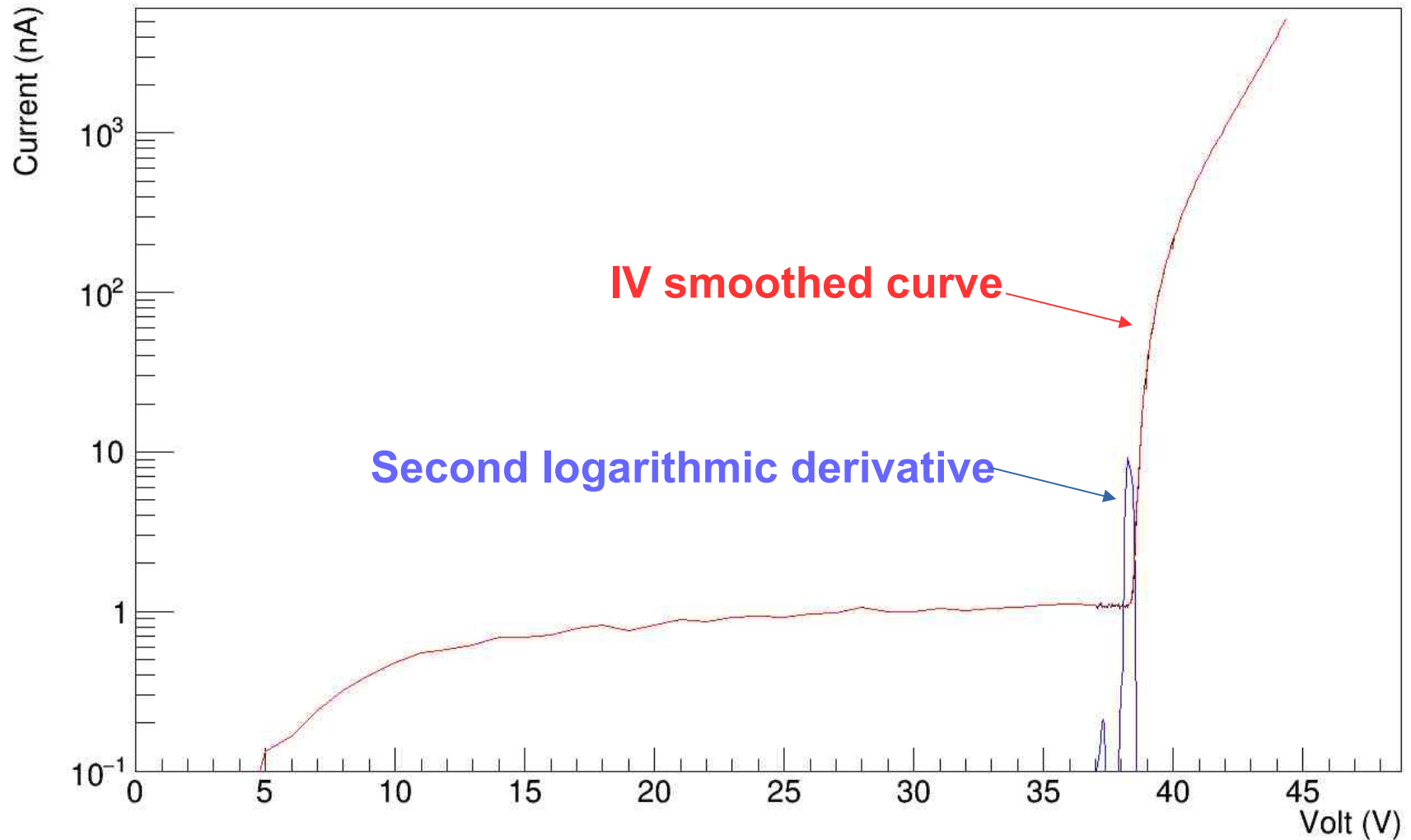
We define the BV at the point where the second logarithmic derivative IV has a maximum.

Example with **Advansid SiPM** used in MEG.

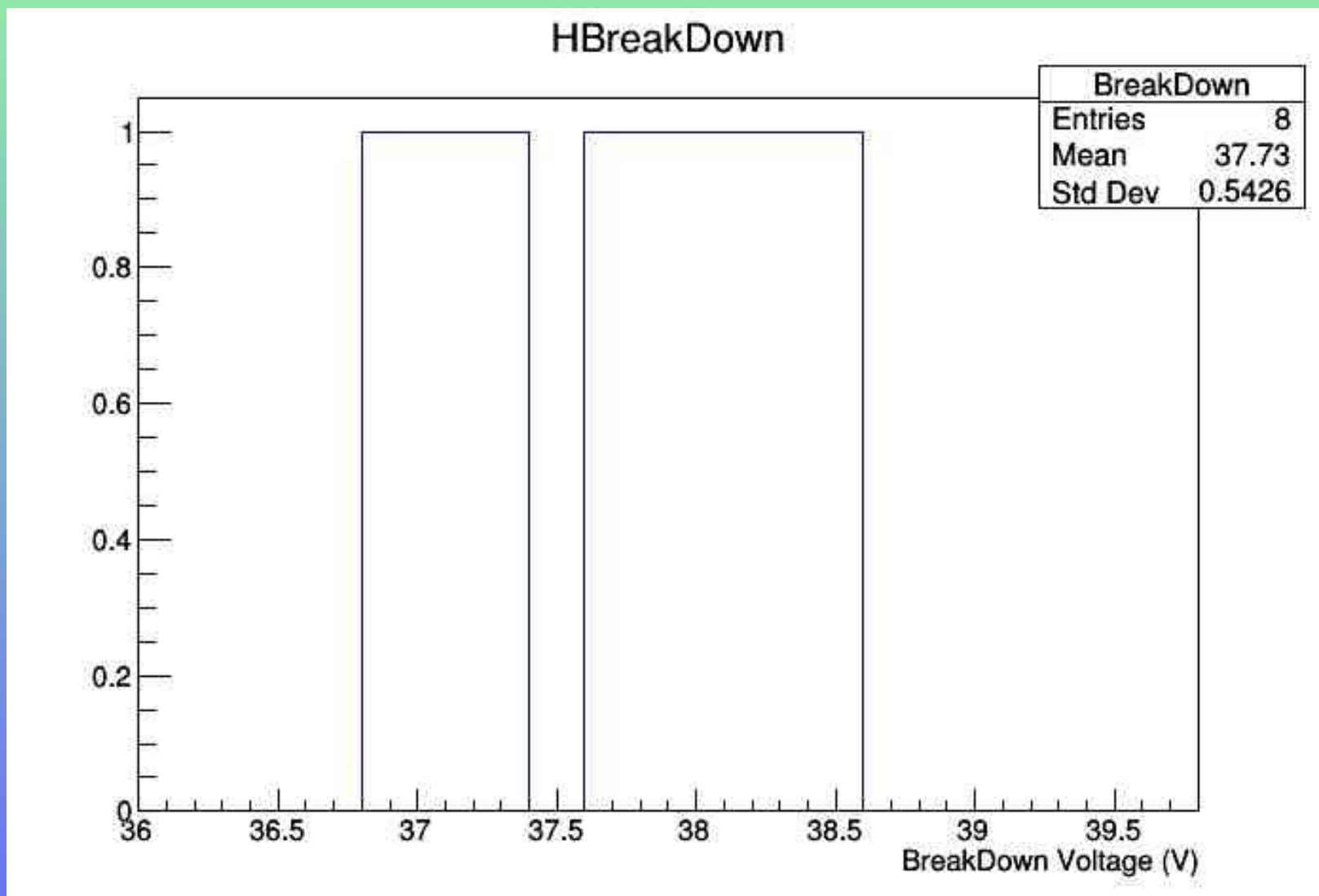


# IV curve of Hamamatsu SiPM

HIVCurve\_SiPM\_0



# Distribution of Hamamatsu SiPM BV





# Dependance on temperature of BreakDown voltage of Hamamatsu SiPM

BV dependence on Temperature for SiPM Ham S14160

