IV Curves Status

R. de Aguiar, M. Arroyave, A. Cervera and F. Galizzi

Bias & Trim: digital-voltage conversion

Each AFE of DAPHNE provides bias to 8 PDS channels through 2 DB15 connectors.

Among the 8 channels, we can just fine-tuning the SiPMs' bias with the Trim (0 - 4.096V) -> FBK and HPK SiPM on different AFEs.

BIAS: $V\_bias = DAC * 39.32 * (4.096\ V / 2^{12}) = DAC * 0.03932\ V$

          $DAC = V\_bias * 25.43$
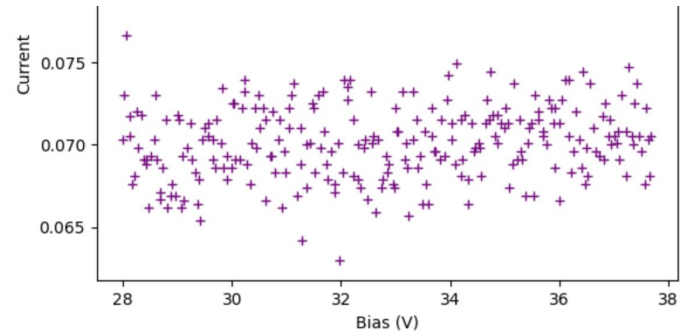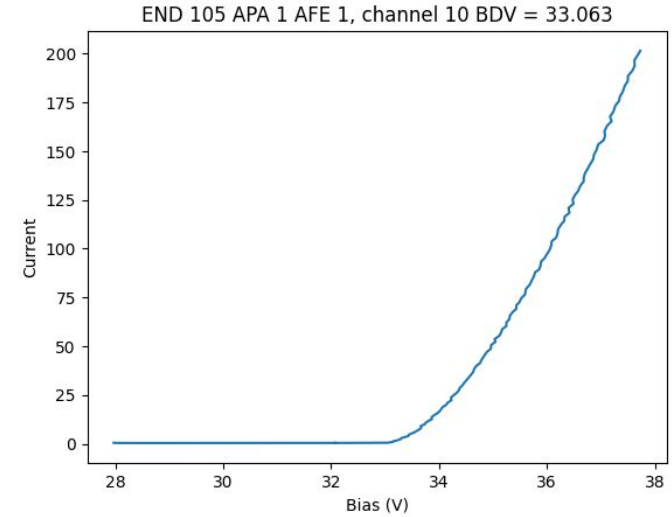
TRIM: $V\_trim = DACt * 0.001$

State of the art and aim

We have scripts to read all channels of an endpoint (daphne) performing a coarse scan with the bias and a fine scan with the trim
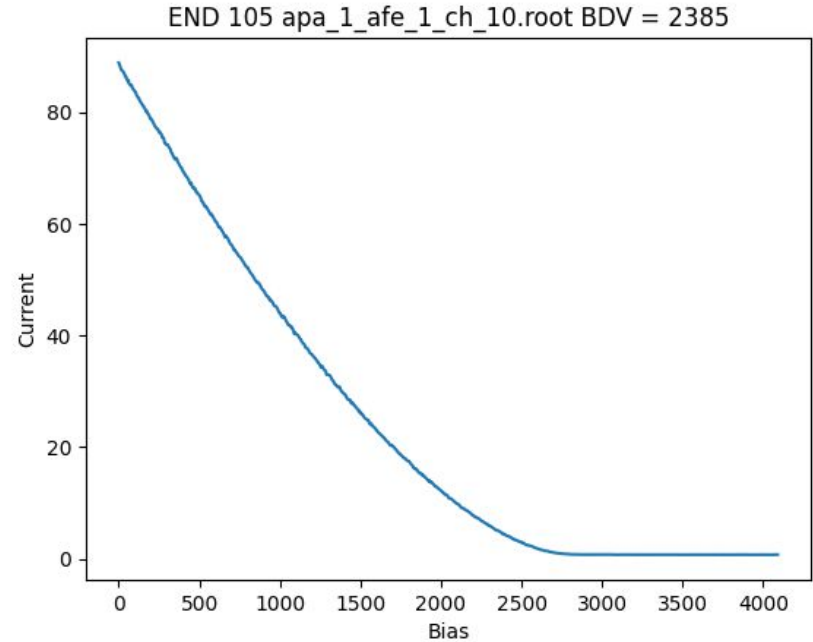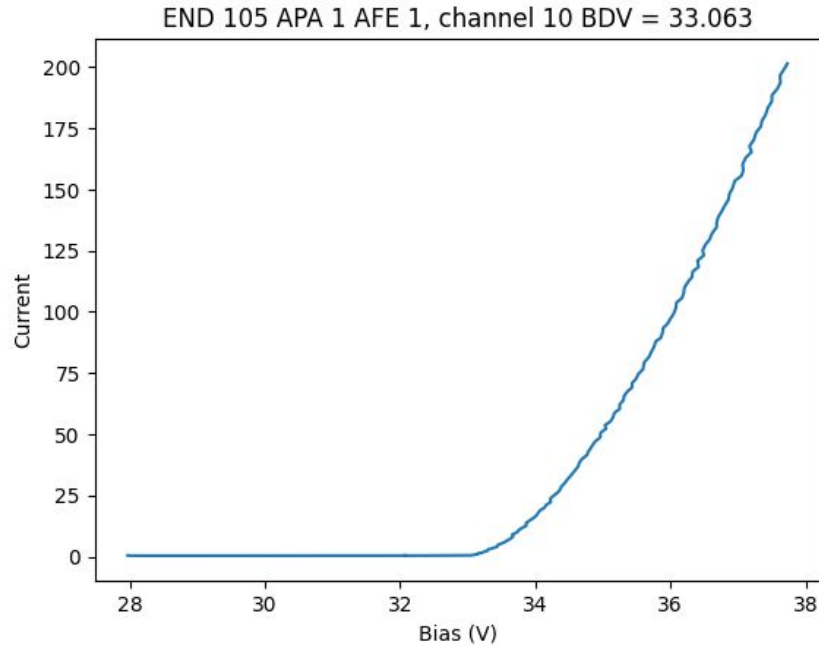
Next steps:

- automatic loop on all the endpoints
- comparison with expectation values
- warm/cold problem

Aim: ensure that we have good data (as many as possible!) for future analyses
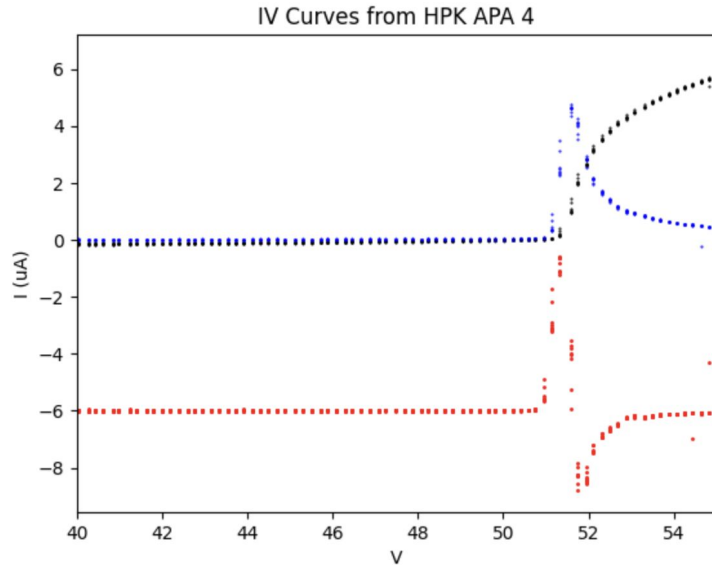
Examples

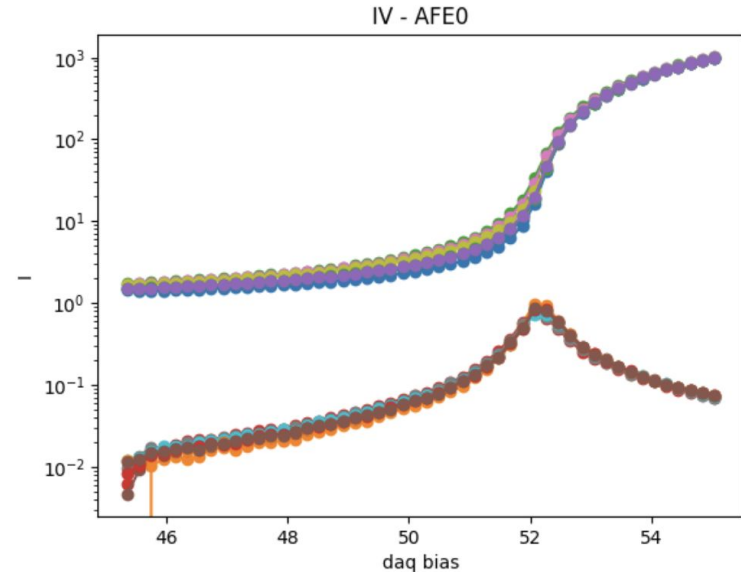Here "Bias" is actually the trim level. The real SiPM bias is given by AFE bias - ch. trim

Methods

The second derivative method give a V_bd estimate lower (ref. our preliminary analysis and literature)

Second derivative maximum

Derivative of the logarithm

Filling problem (?)

During the filling we want to perform Vbd and DCR studies as a function of temperature, however, we will have modules inside and outside the LAr connected to the same AFE

The V_bd strongly depend on the temperature

    e.g. FBK room T = 32.7V

        FBK LAr = 27.0V

The must avoid to bias the sensors in cold over a certain threshold -> trim on the SiPMs above the LAr level

APA: 3 DAPHNE: # 8 – ENDPOINT 111

FBK / HPK

APA3

AFE 4
~3m

LAr level
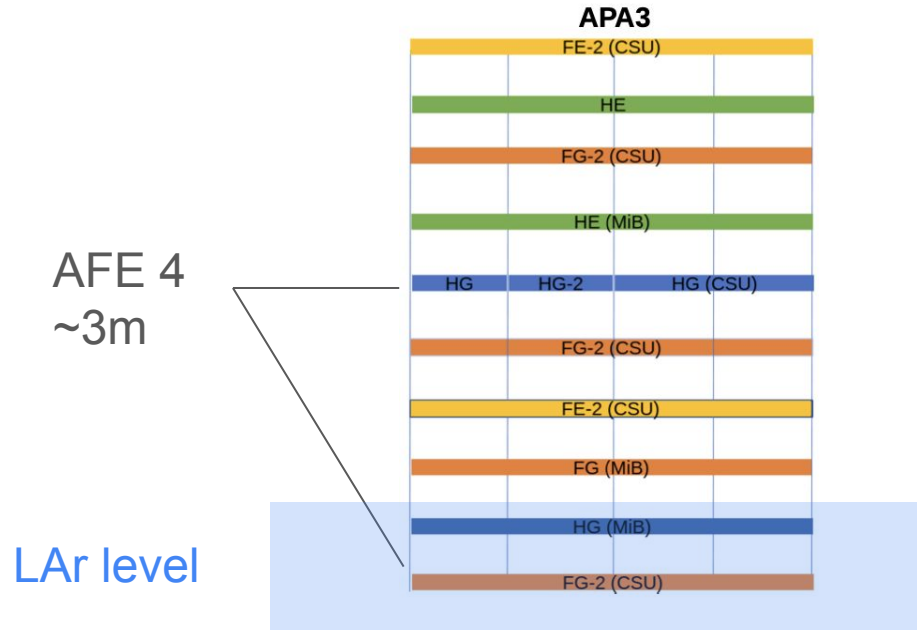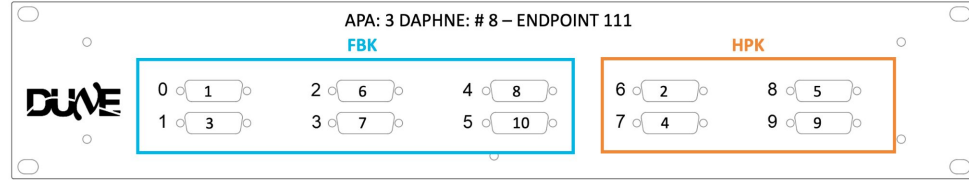
Possible solution

- We can just set up one BIAS for each AFE, however, the trim is set per channel;

- Right now we have a draft of a script which identifies a variation of the current during the IV acquisition and sends a trim information to the channel reducing the BIAS on it.

- We will need feedback from the analysis teams to fix the Vbd for each channel. We will populate the table as soon as possible with the estimated Vbd for each facility.