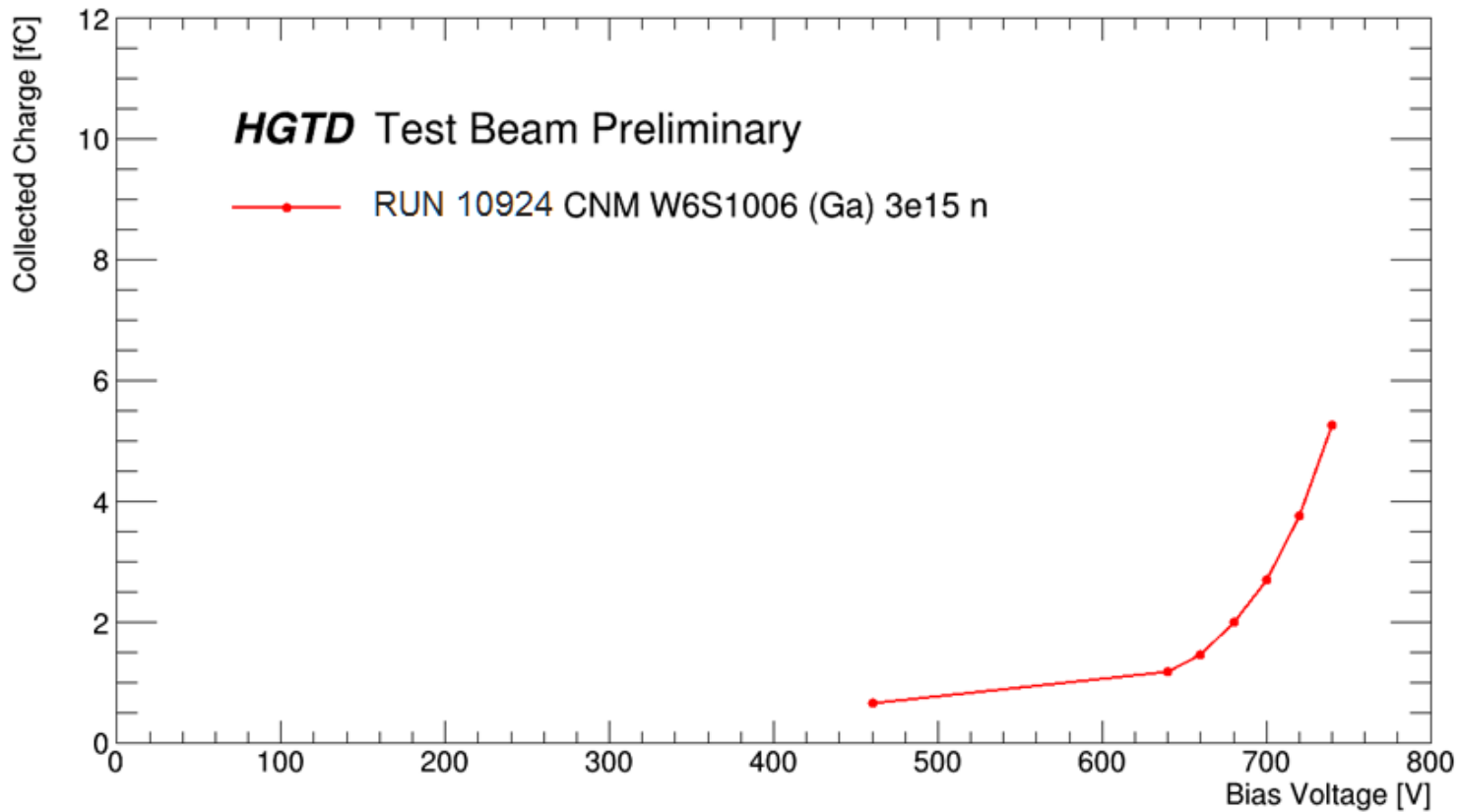# HGTD plots for approval

C. Grieco, L. Castillo García, V. Gkougkousis, S. Grinstein

Collected charge vs Bias voltage

Fluence uncertainty = 10%

Charge for each event is calculated as the integral of the signal area for each waveform after pedestal substraction. The collected charge for each voltage point corresponds to the MPV of the Landau-Gauss fit of the events charge distribution.

Time resolution vs Collected charge

Fluence uncertainty = 10%
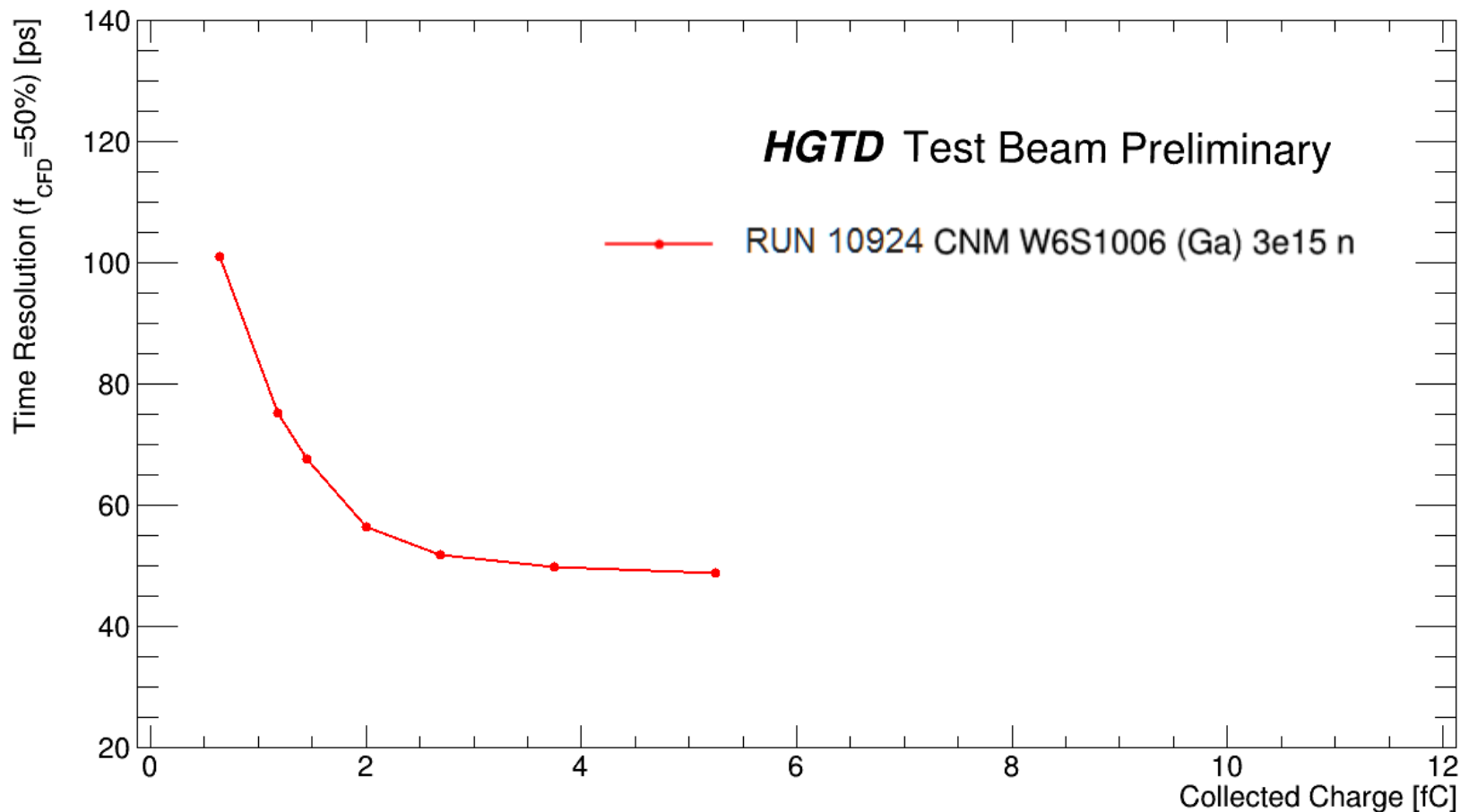
Time resolution is calculated as the difference between the time at f_{CFD}=50% for DUT and the time at f_{CFD}=20% for the unirradiated LGA35 (reference time sensor):
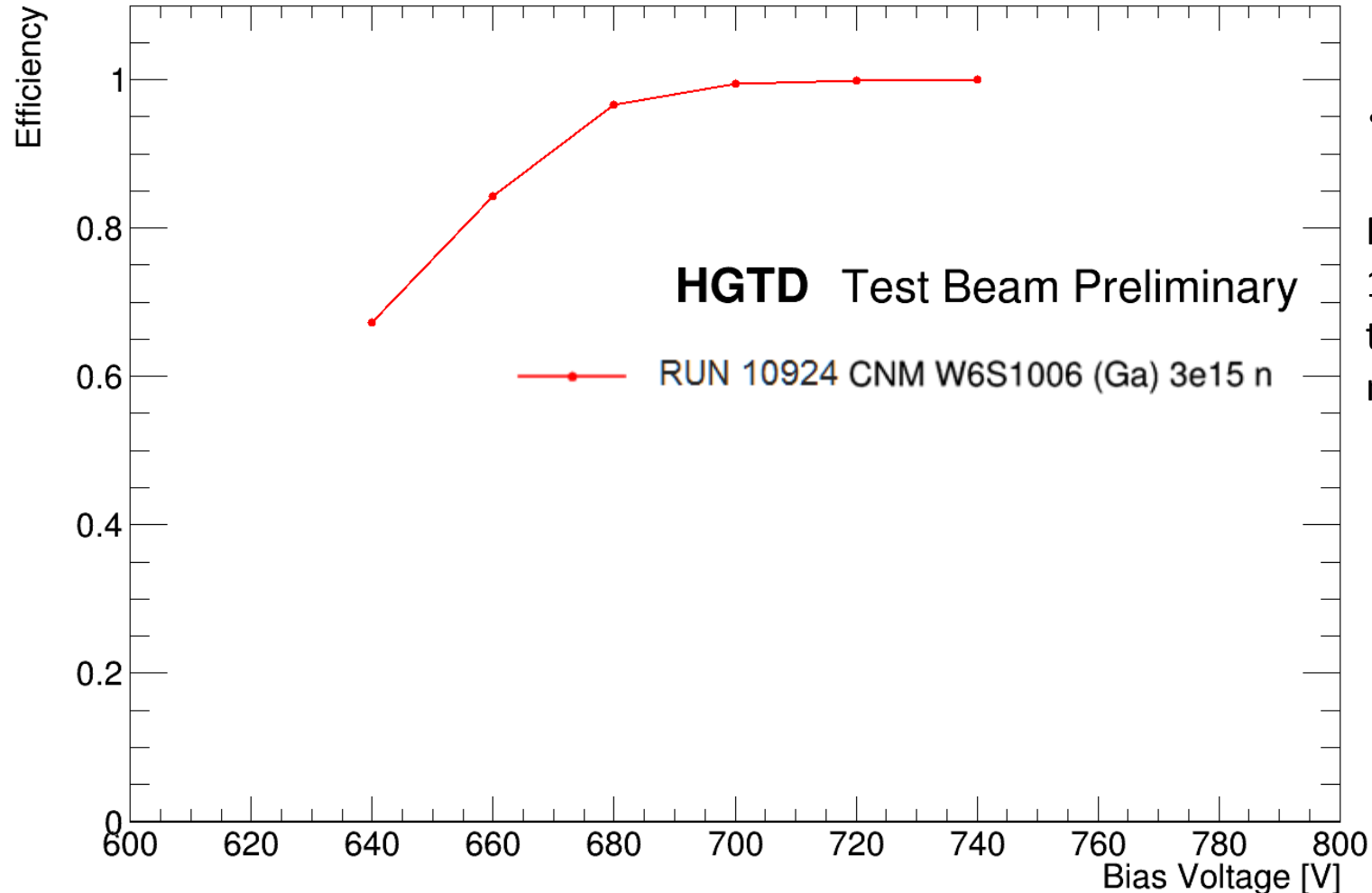
$$\Delta t = t_{DUT(f_{CFD}=50\%)} - t_{LGA35(f_{CFD}=20\%)}$$

The time differences distribution is fitted with a Gaussian with the time resolution of the system defined as the σ of the Gaussian.
The contribution from the LGA35 is subtracted ($\sim$29,7 ps at -28° C).

Efficiency vs Bias voltage

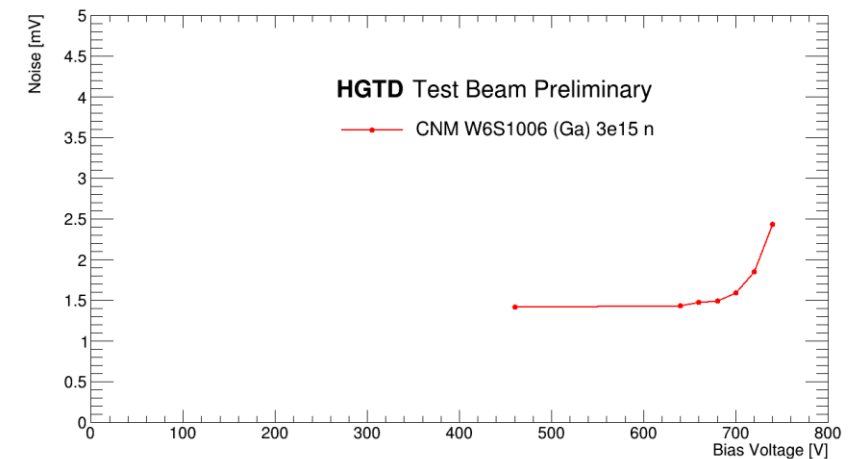Fluence uncertainty = 10%
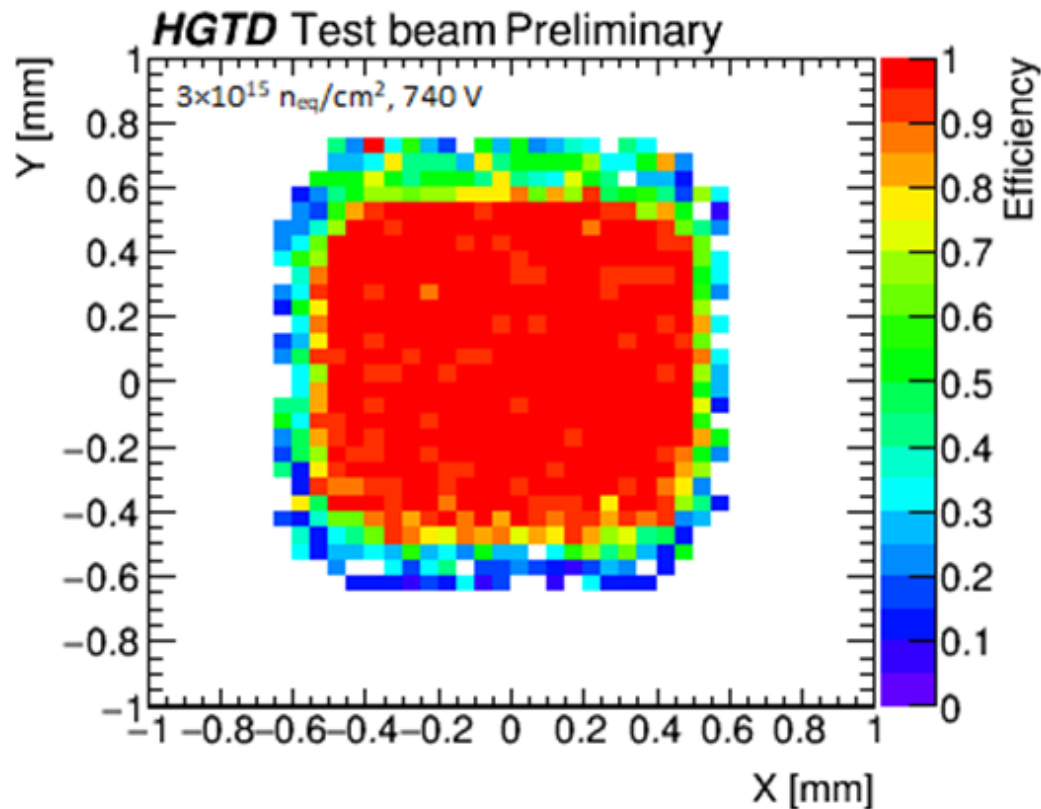
Effciency is defined for each bias voltage point as:

$$\varepsilon = \frac{Tracks\ in\ the\ ROI\ with\ signal > 10mV}{Tracks\ in\ the\ ROI}$$

For HV > 700 V → Efficiency > 99%
10mV threshold is chosen because is more than 5σ over the noise (assuming a median noise level of 2mV from the plot below)

HGTD Test Beam Preliminary

RUN 10924 CNM W6S1006 (Ga) 3e15 n

Efficiency 2D map

Fluence uncertainty = 10%

Efficiency map for 740 V is defined as

$$\varepsilon = \frac{Tracks\ with\ Q > 2\ fC}{Total\ number\ of\ Tracks}$$

Q > 2 fC threshold corresponds to ~15 mV for this voltage point.

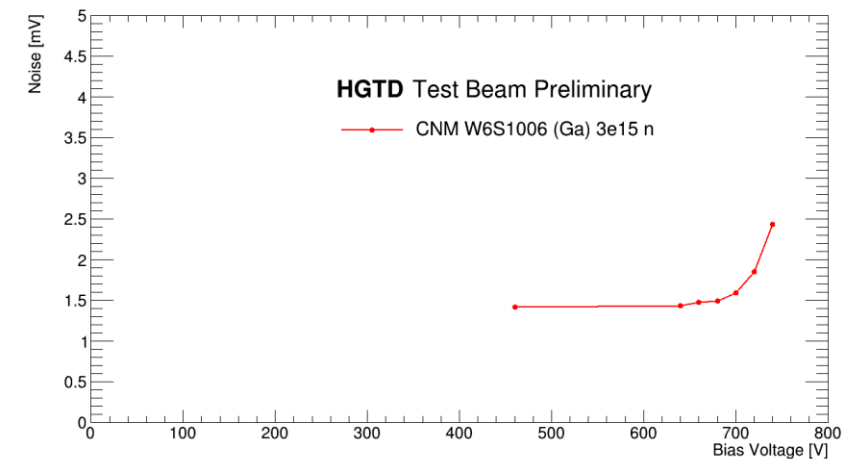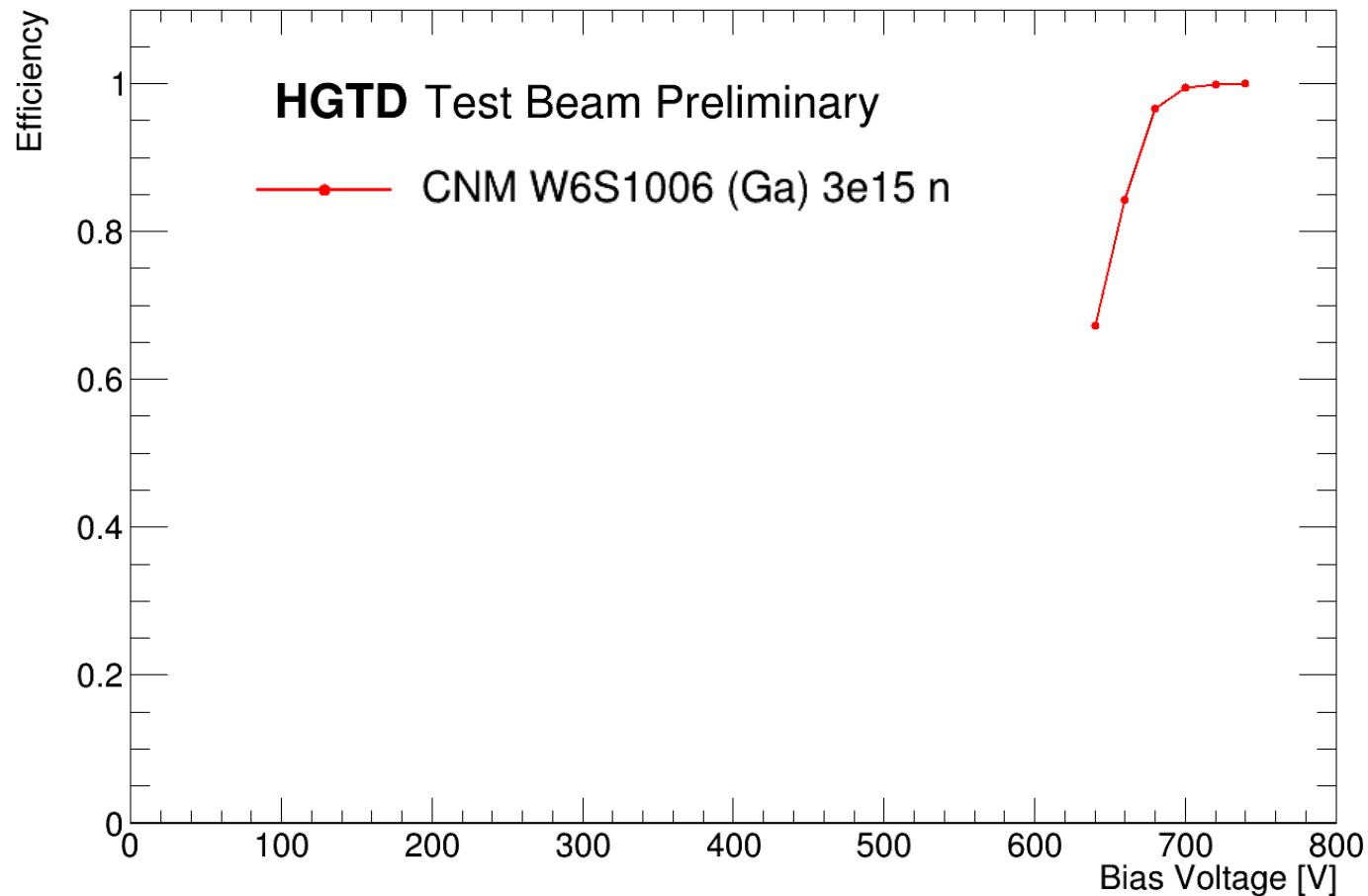The average efficiency in the central 0,5x0,5 mm² area is **99,1%**

BACKUP

Efficiency vs Bias voltage

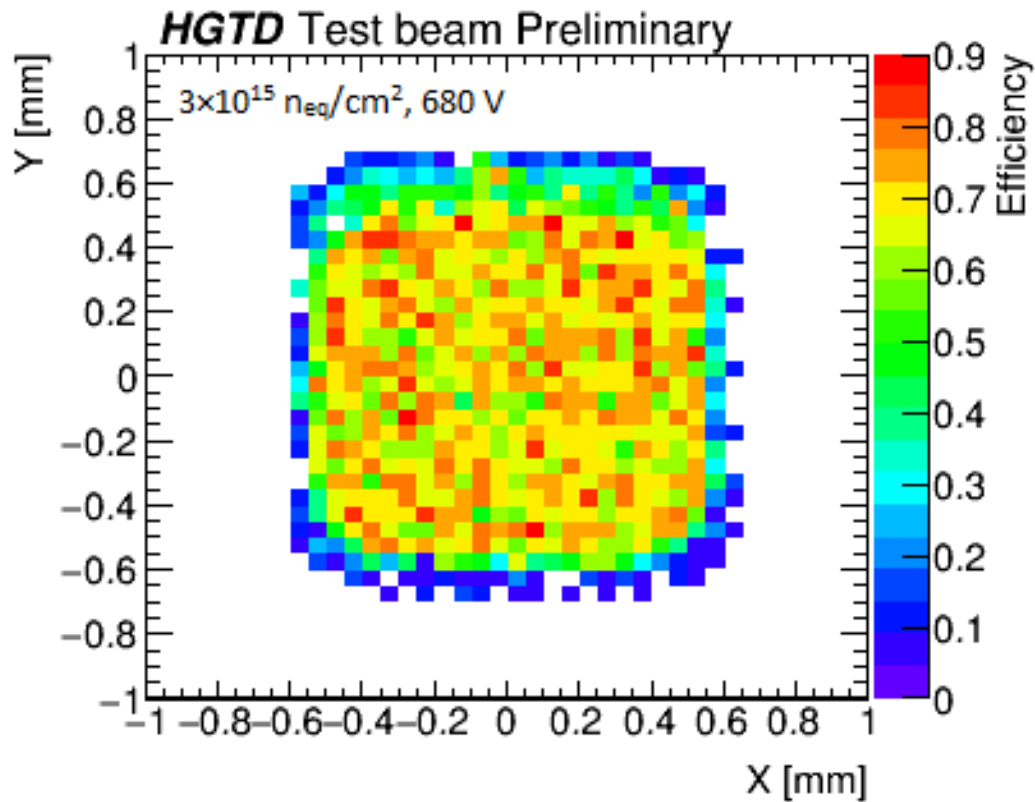Effciency is defined for each bias voltage point as:

$$\varepsilon = \frac{Tracks\ in\ the\ ROI\ with\ signal > 10mV}{Tracks\ in\ the\ ROI}$$

For HV > 700 V → Efficiency > 99%
10mV threshold is chosen because is more than 5σ over the noise (assuming a median noise level of 2mV from the plot below)

Efficiency 2D map

Efficiency map for 740 V is defined as

$$\varepsilon = \frac{Tracks\ with\ Q > 2\ fC}{Total\ number\ of\ Tracks}$$

Q > 2 fC threshold corresponds to ~15 mV for this voltage point.

The average efficiency in the central 0,5x0,5 mm² area is **69,6%**