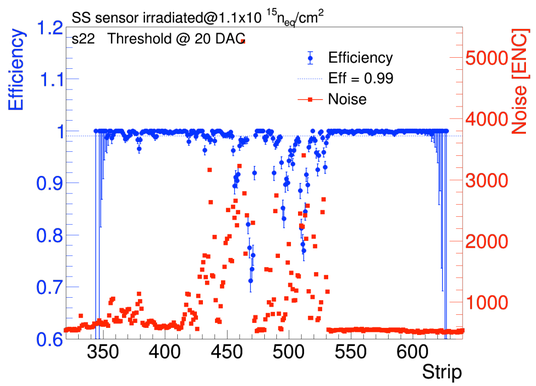
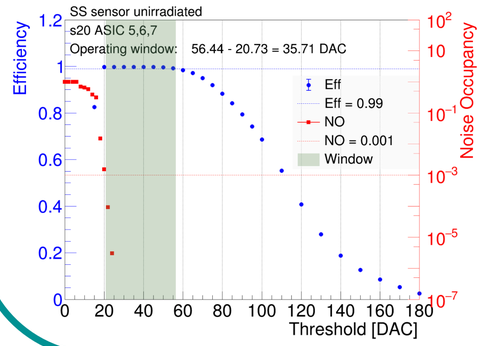
Yajun@DESY: ITk strip test beam, together with Lennart

Cold noise for short strip barrel modules

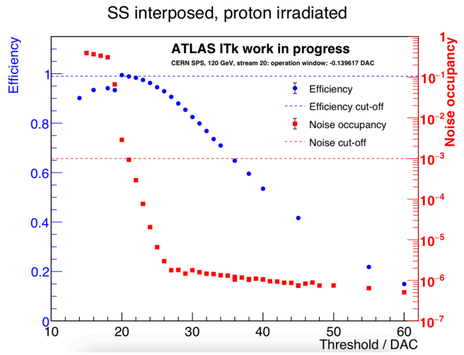


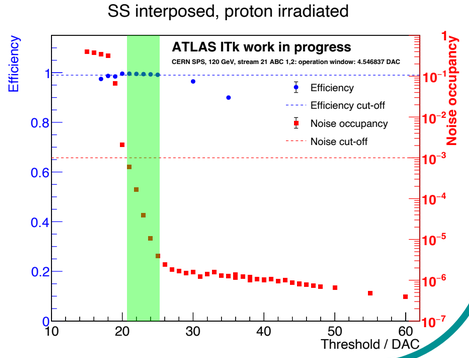
Interposer modules

Before irradiation



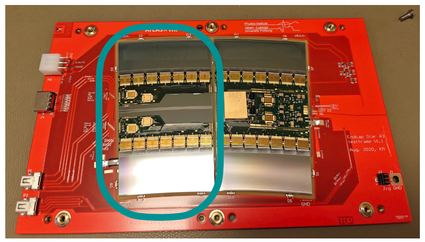
After irradiation

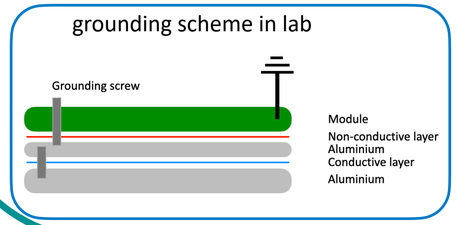




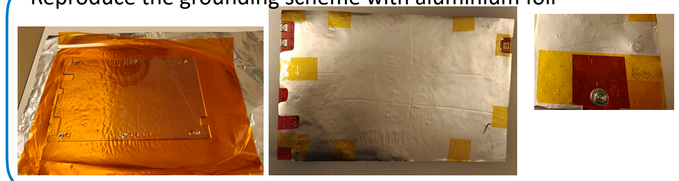
Noise balance/reduction for split endcap modules

Higher noise

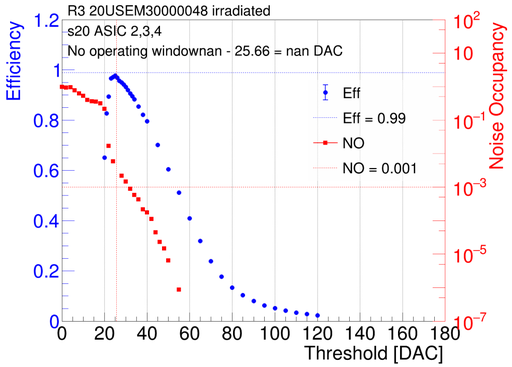




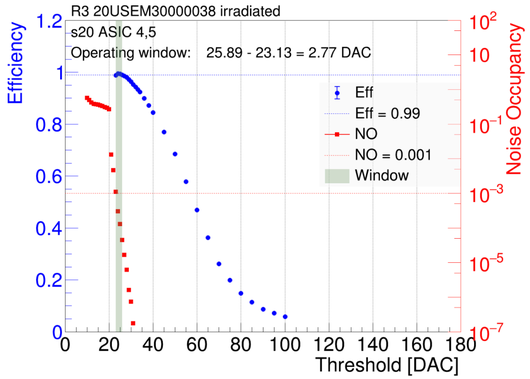
Reproduce the grounding scheme with aluminium foil



Before fix



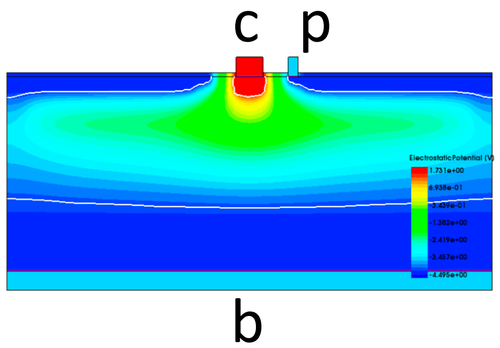
After fix



Also a lot of DAQ improvements this year… Continuous working effort in next year

Yajun@DESY: CMOS pixel capacitance studies

TCAD Pixel capacitance simulation



3-terminals:

$$\begin{bmatrix} i_c \\ i_b \\ i_p \end{bmatrix} = \begin{bmatrix} C_{cc} & -C_{cb} & -C_{cp} \\ -C_{bc} & C_{bb} & -C_{bp} \\ -C_{pc} & -C_{pb} & C_{pp} \end{bmatrix} \times \begin{bmatrix} \frac{dV_c}{dt} \\ \frac{dV_b}{dt} \\ \frac{dV_p}{dt} \end{bmatrix}$$

For collection electrode:

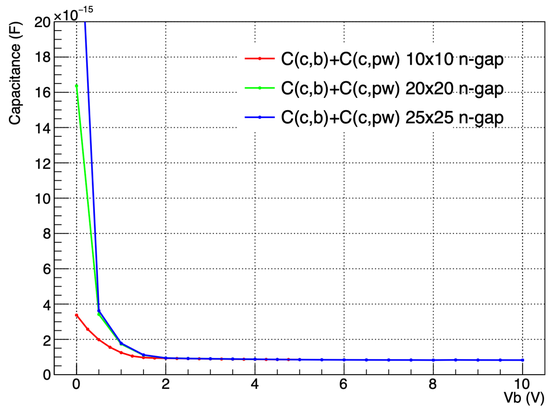
$$I_c(t) = I_{DC,c}(t) + i_c(t)$$

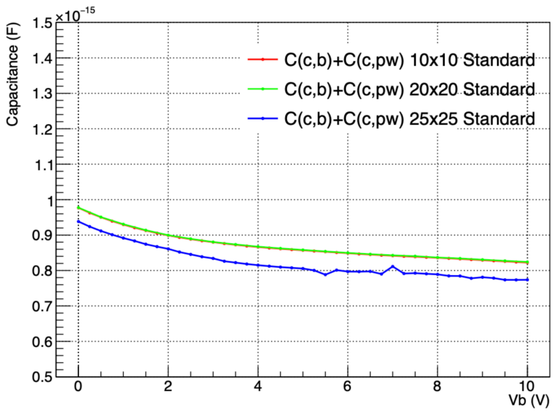
$$i_c = \frac{dq_c}{dt} = C_{cc}\frac{dV_c}{dt} - C_{cb}\frac{dV_b}{dt} - C_{cp}\frac{dV_p}{dt}$$

$$C_{cc} = C_{cb} + C_{cp}$$

$$V_b = V_p = V_s$$

$$i_c(t) = (C_{cb} + C_{cp})(\frac{dV_c}{dt} - \frac{dV_s}{dt})$$

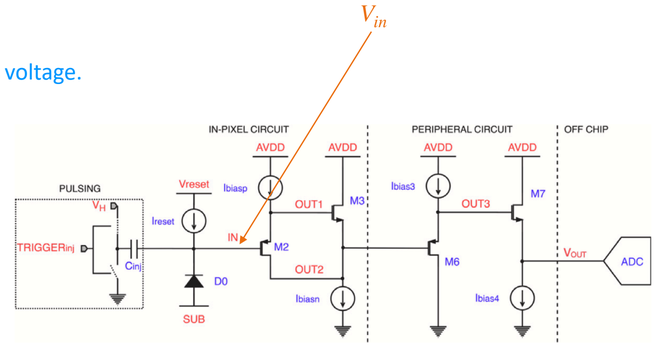


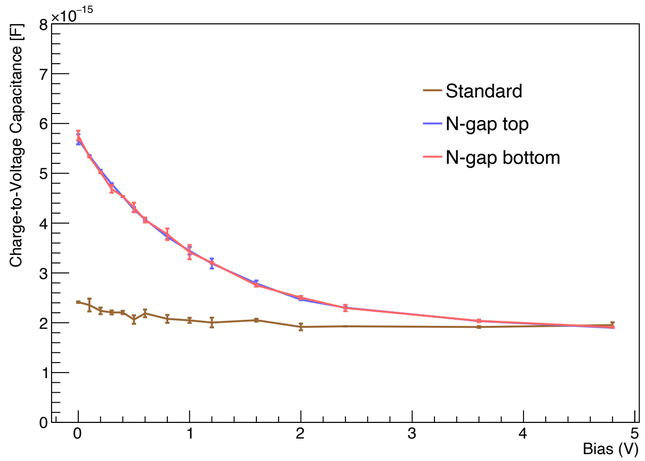


Charge-to-voltage conversion capacitance measurement using Fe55

- All contributions seen at the input of SF M2:
  - Total pixel capacitance
    - From the sensor design, input for circuit design and depends on bias voltage
  - Parasitic capacitance
  - Injection capacitance
  - M0 (Vreset circuit transistor)
  - M2
    - Independent on the bias voltage.

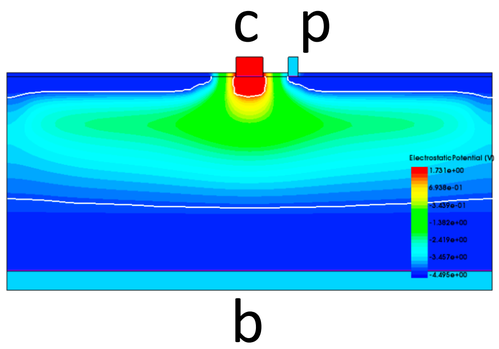
APTS SF





Yajun@DESY: CMOS pixel capacitance studies

TCAD Pixel capacitance simulation



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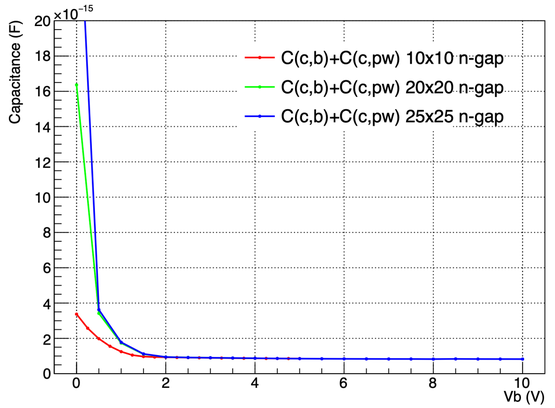
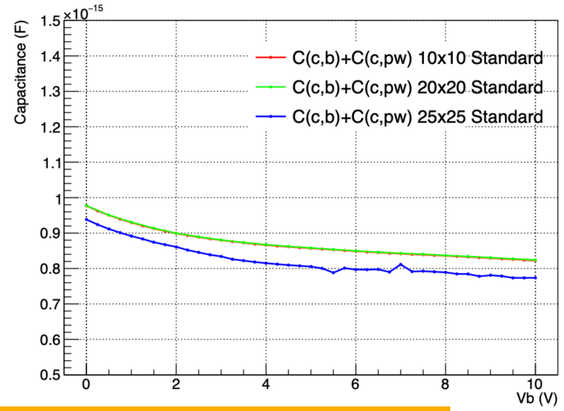
$C_{cc} = C_{cb} + C_{cp}$

$V_b = V_p = V_s$

$$i_c(t) = (C_{cb} + C_{cp})(\frac{dV_c}{dt} - \frac{dV_s}{dt})$$

Thinking hard





Will focus more on simulations in next months

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