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Mk x Nk Gated CMOS Imager

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Mk x Nk Gated CMOS Imager

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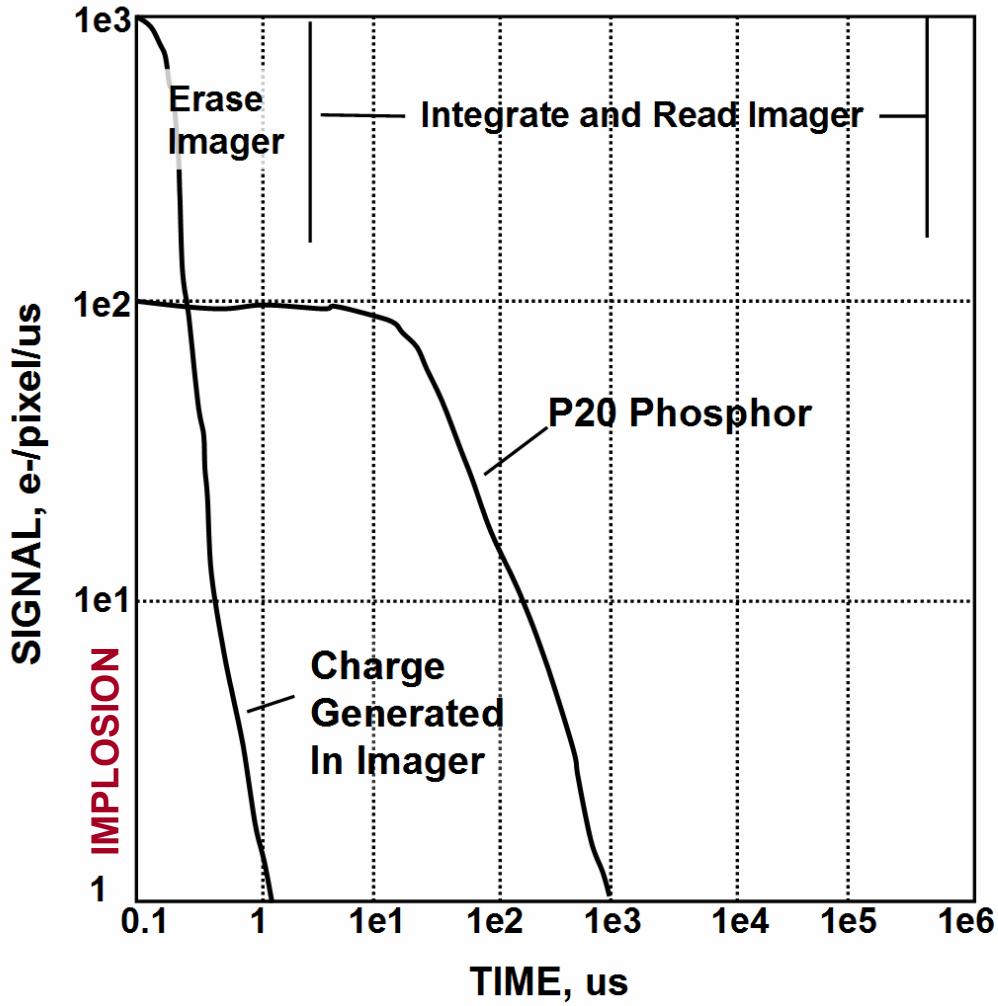
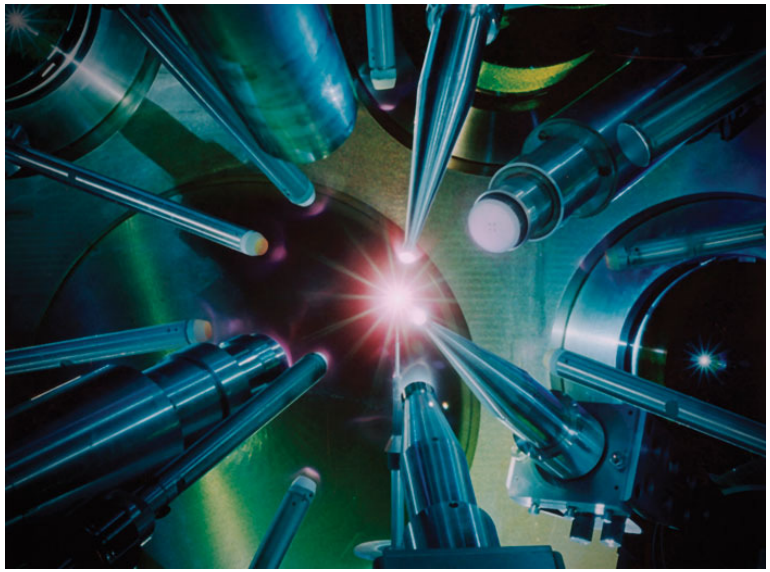
Target Diagnostics Physics and Engineering for Inertial Confinement Fusion III (Conference 9211)

Inertial Confinement Fusion at the National Ignition Facility



NIF



CCD or CMOS IMAGERS ?

FUNDAMENTAL CCD PROBLEMS FOR THE APPLICATION :

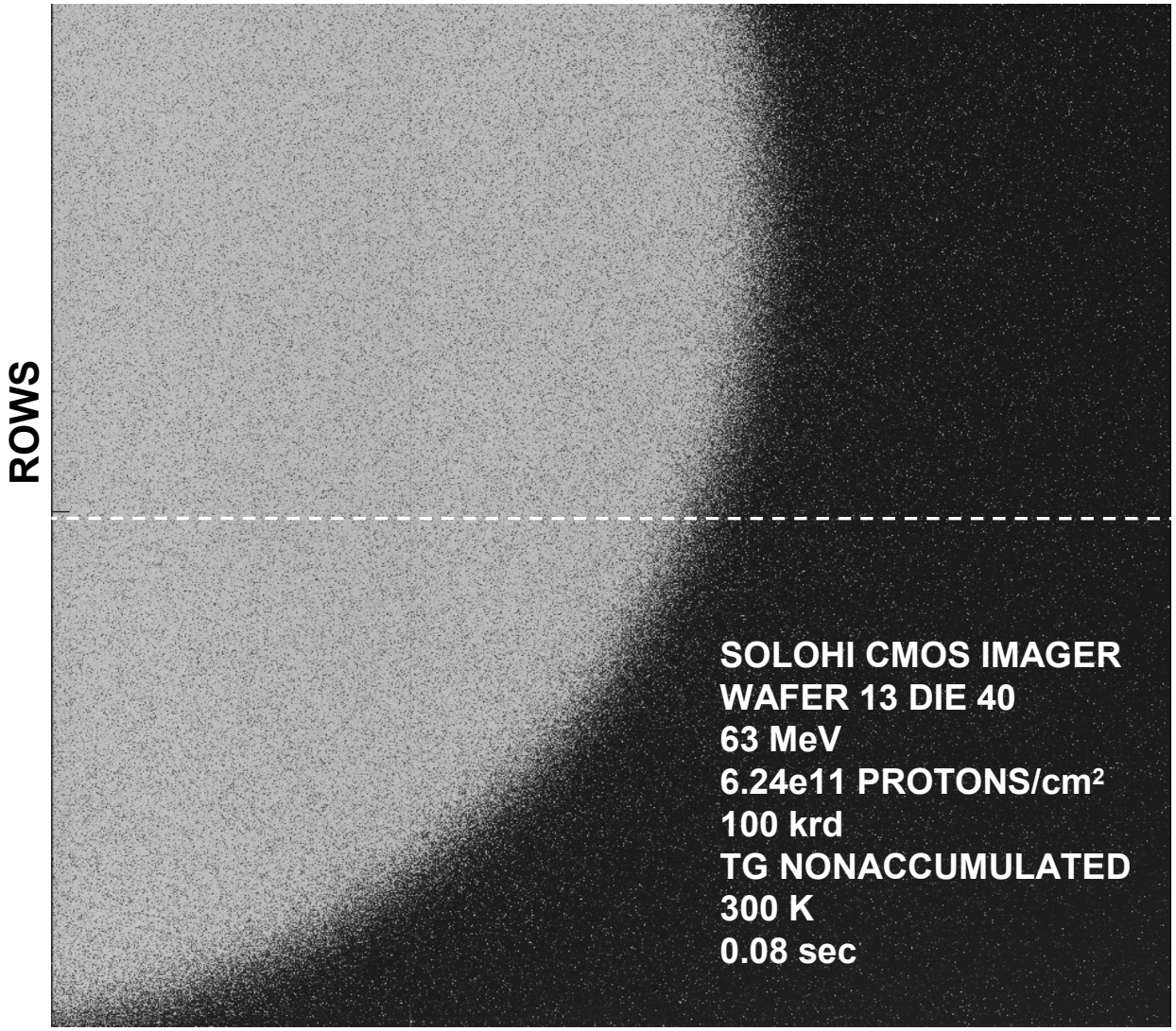
1- SILICON RADIATION BULK DAMAGE (CTE)
2- GATE OXIDE RADIATION IONIZATION DAMAGE (FLAT BAND SHIFT)
3- ERASURE BY READING THE ENTIRE IMAGER (TAKES TIME !)

CMOS SOLUTIONS:

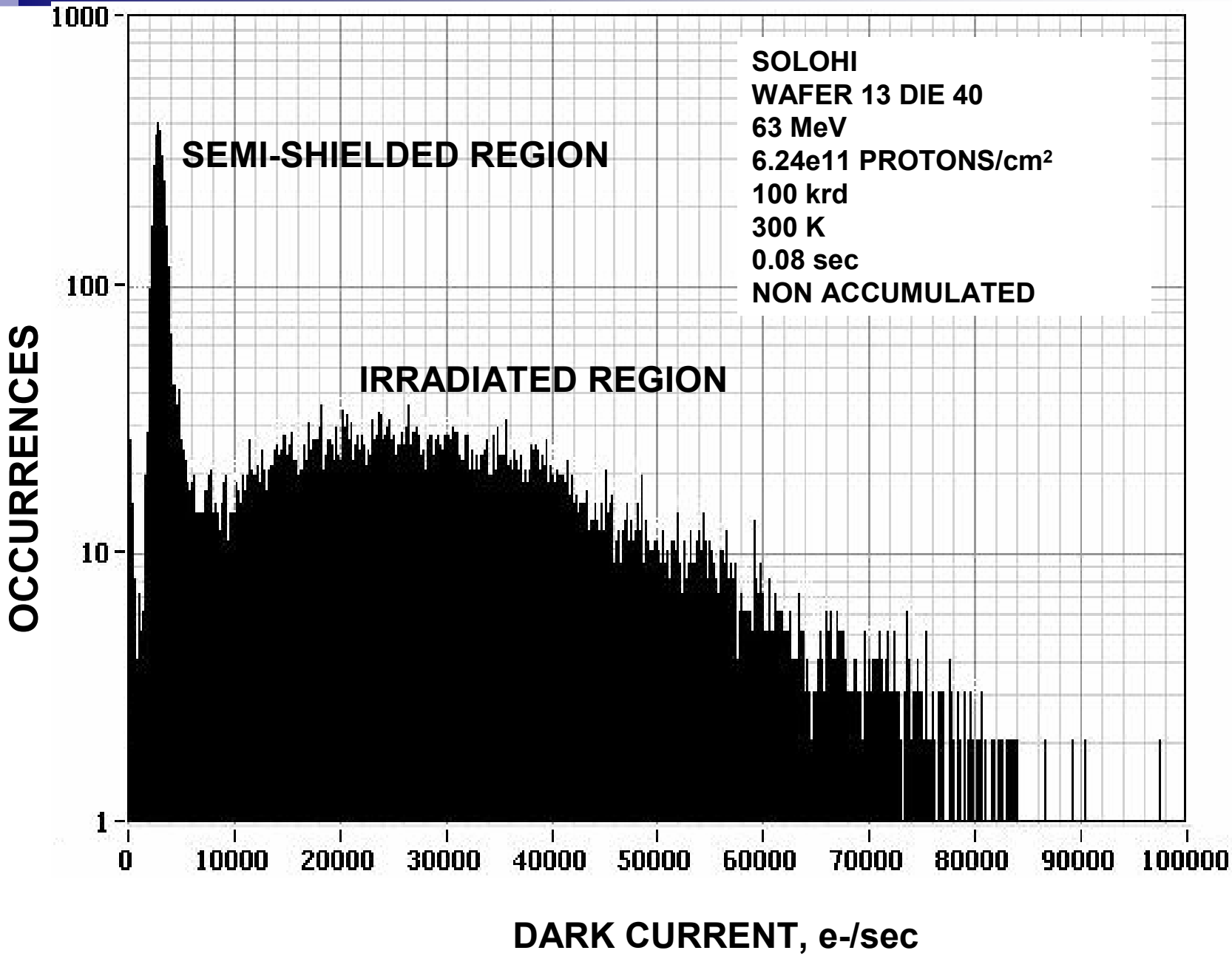
1-CMOS X-Y RANDOM ACCESS PIXEL ADDRESSING
2-THIN GATE OXIDE (50 A versus 2000 A)
3-GLOBAL RESETS ALL PIXEL SIMULTANEOUSLY IN SHORT ORDER ~ 1 us

CMOS RADIATION DAMAGE

RADIATION INDUCED DARK CURRENT
CCD = CMOS

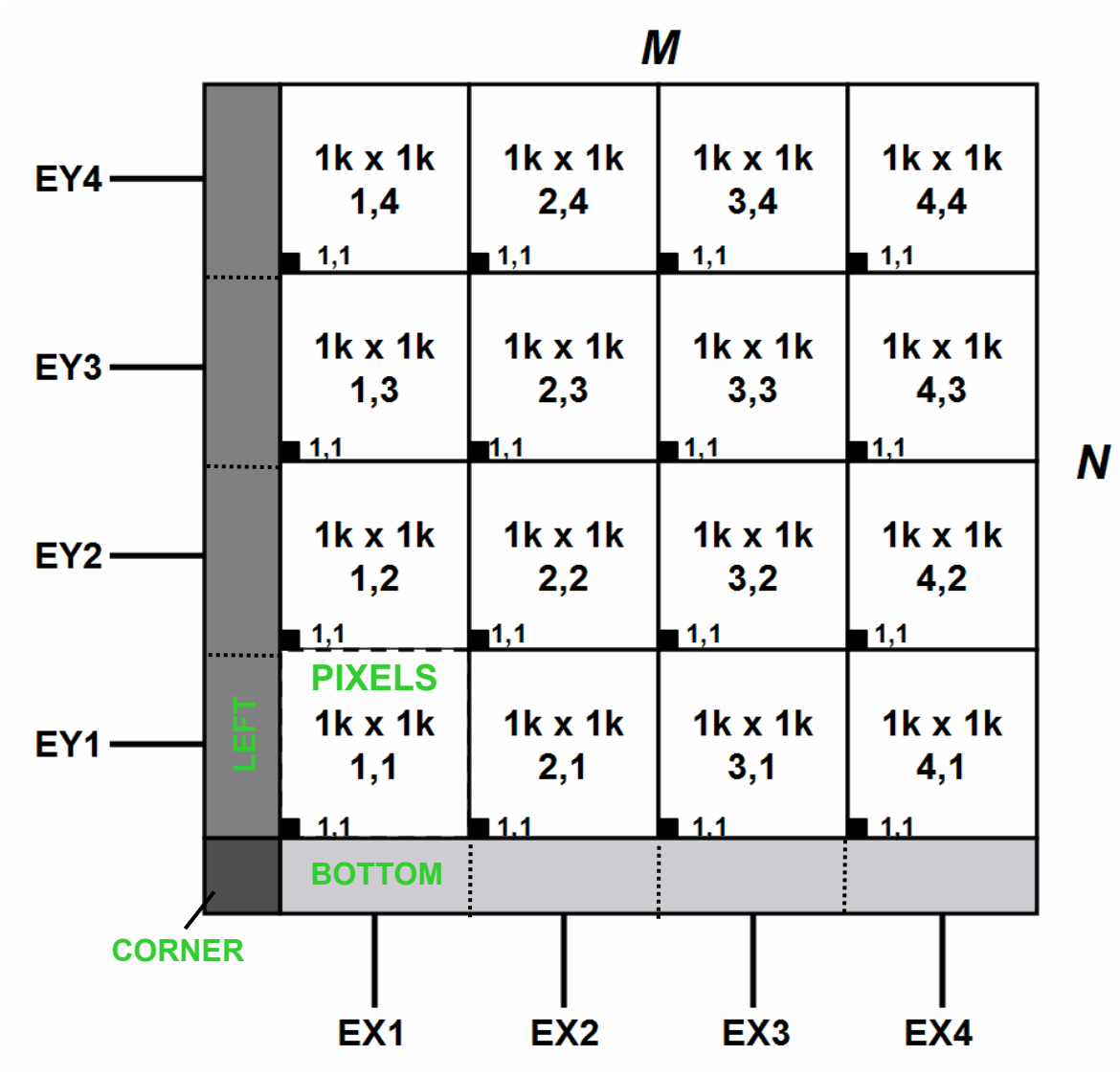


CMOS RADIATION DAMAGE

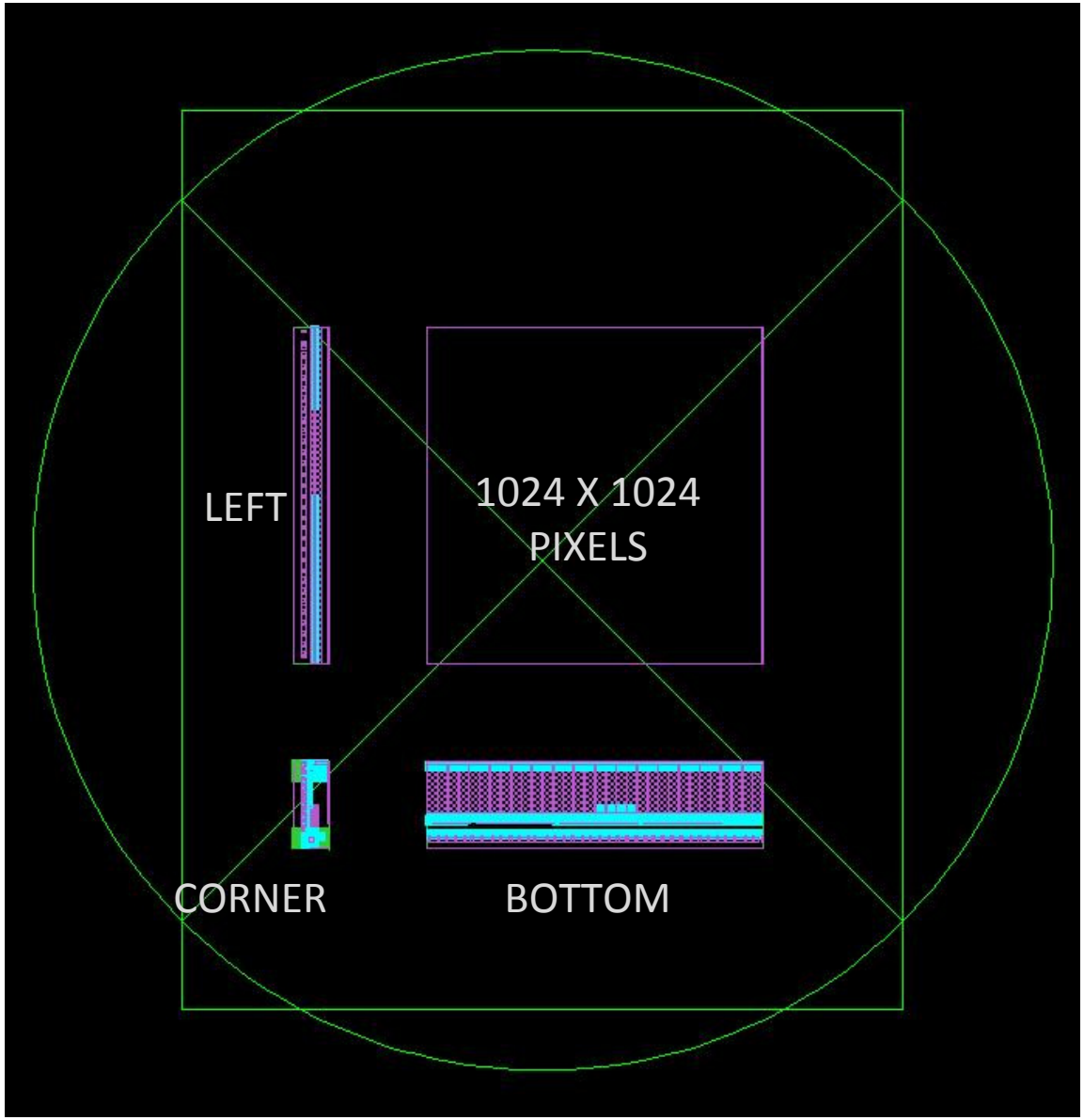


Mk x Nk CMOS IMAGER

LLNL
M=N=4

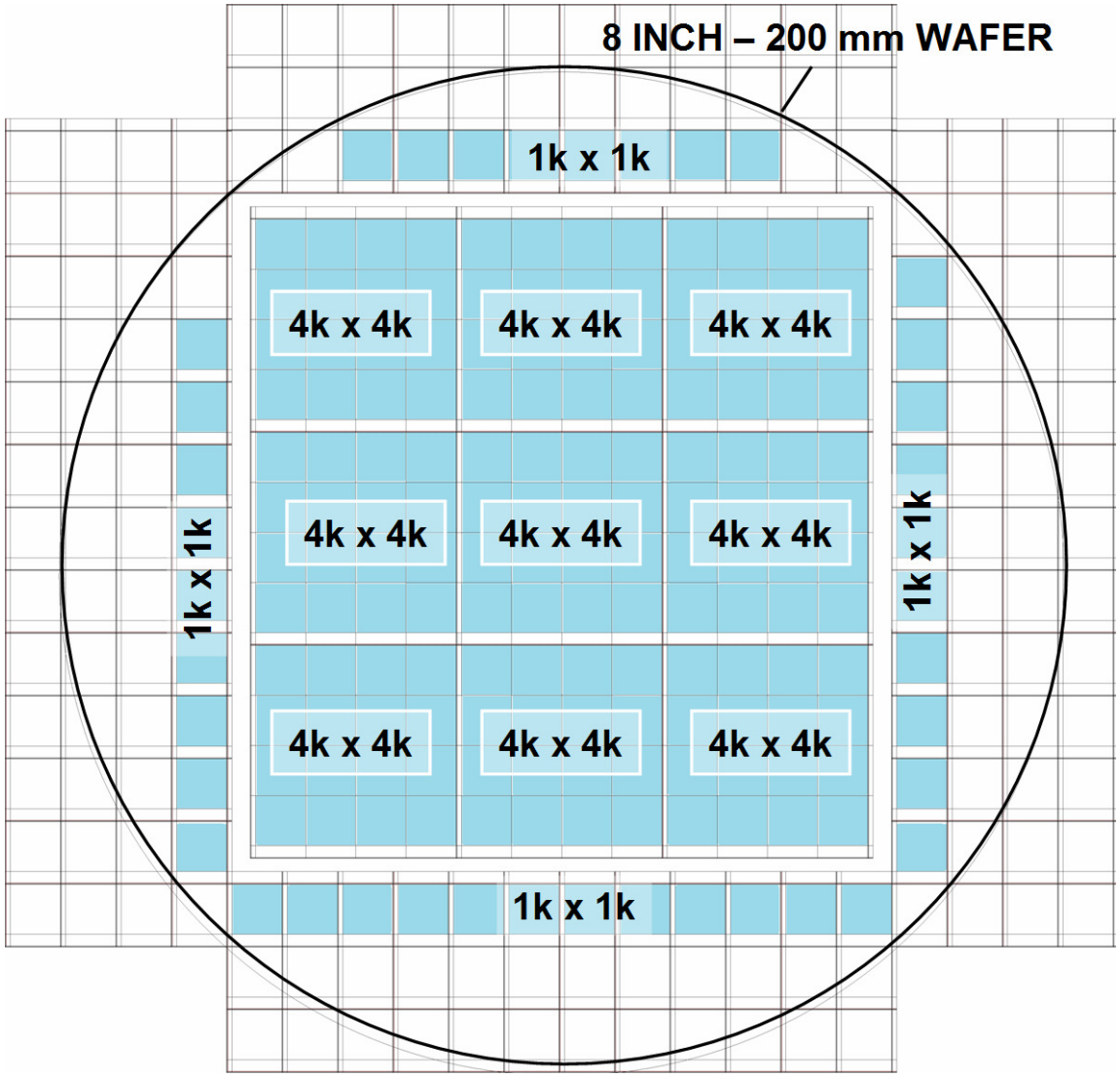


Mk x Nk RETICULE

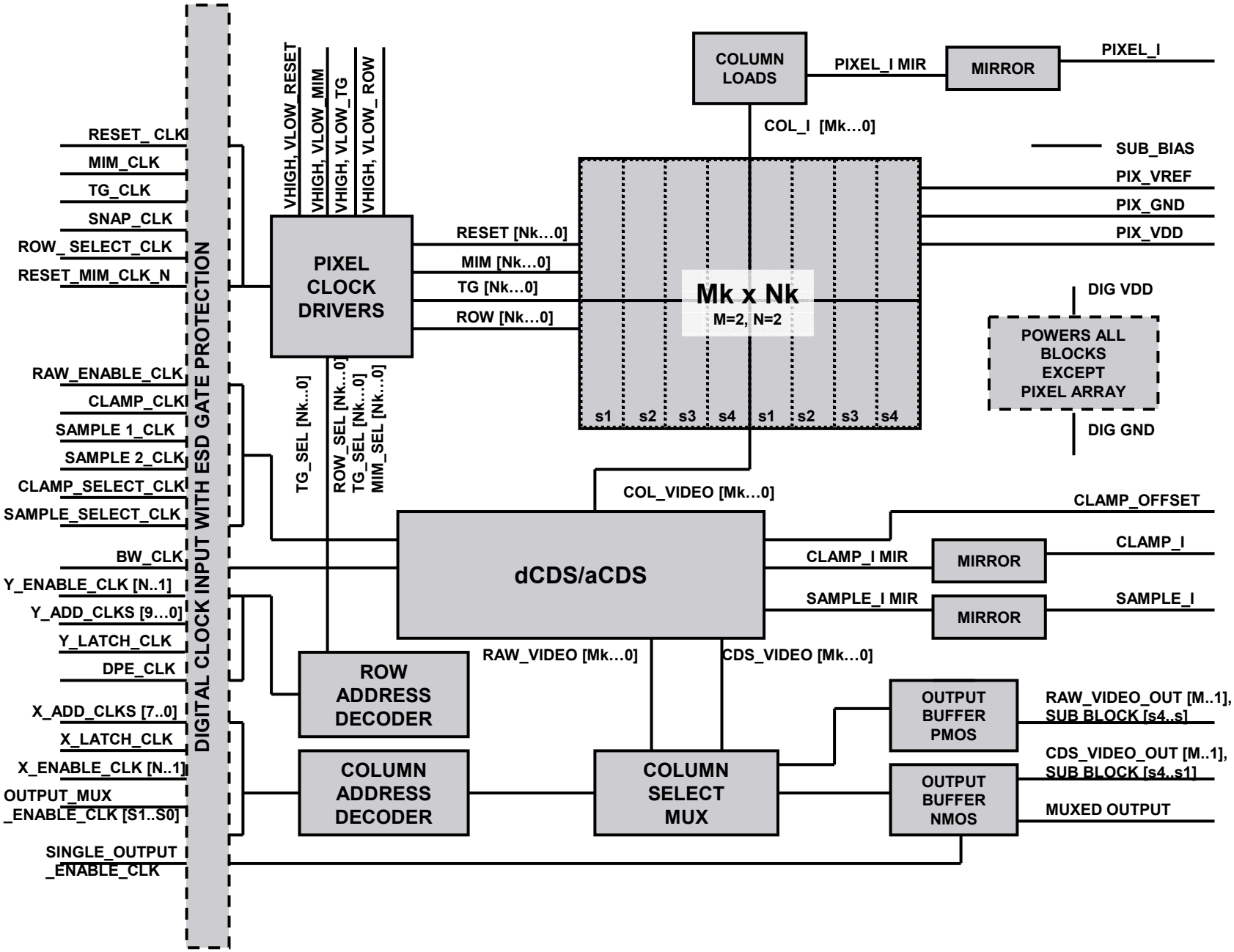


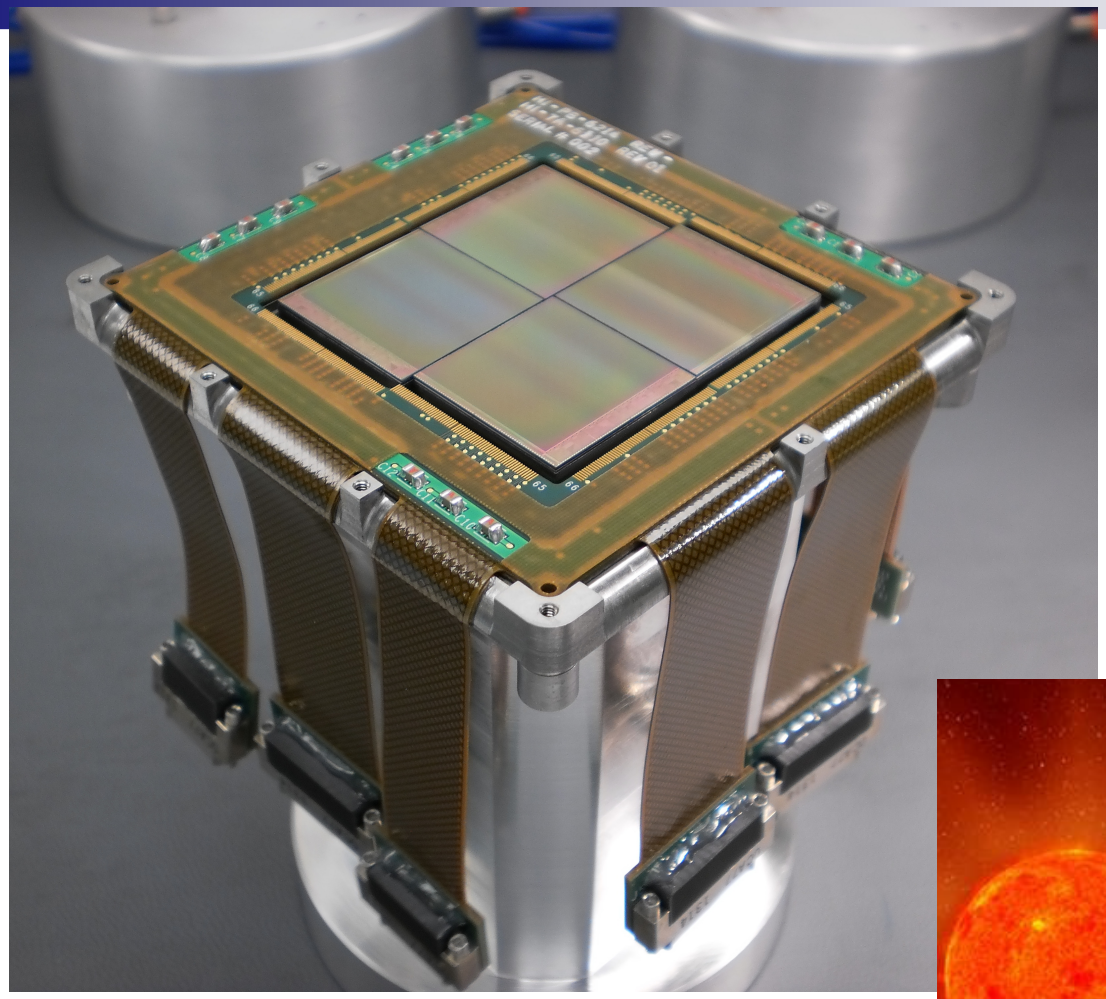
Mk X Nk WAFER MAP

LLNL
M=N=4



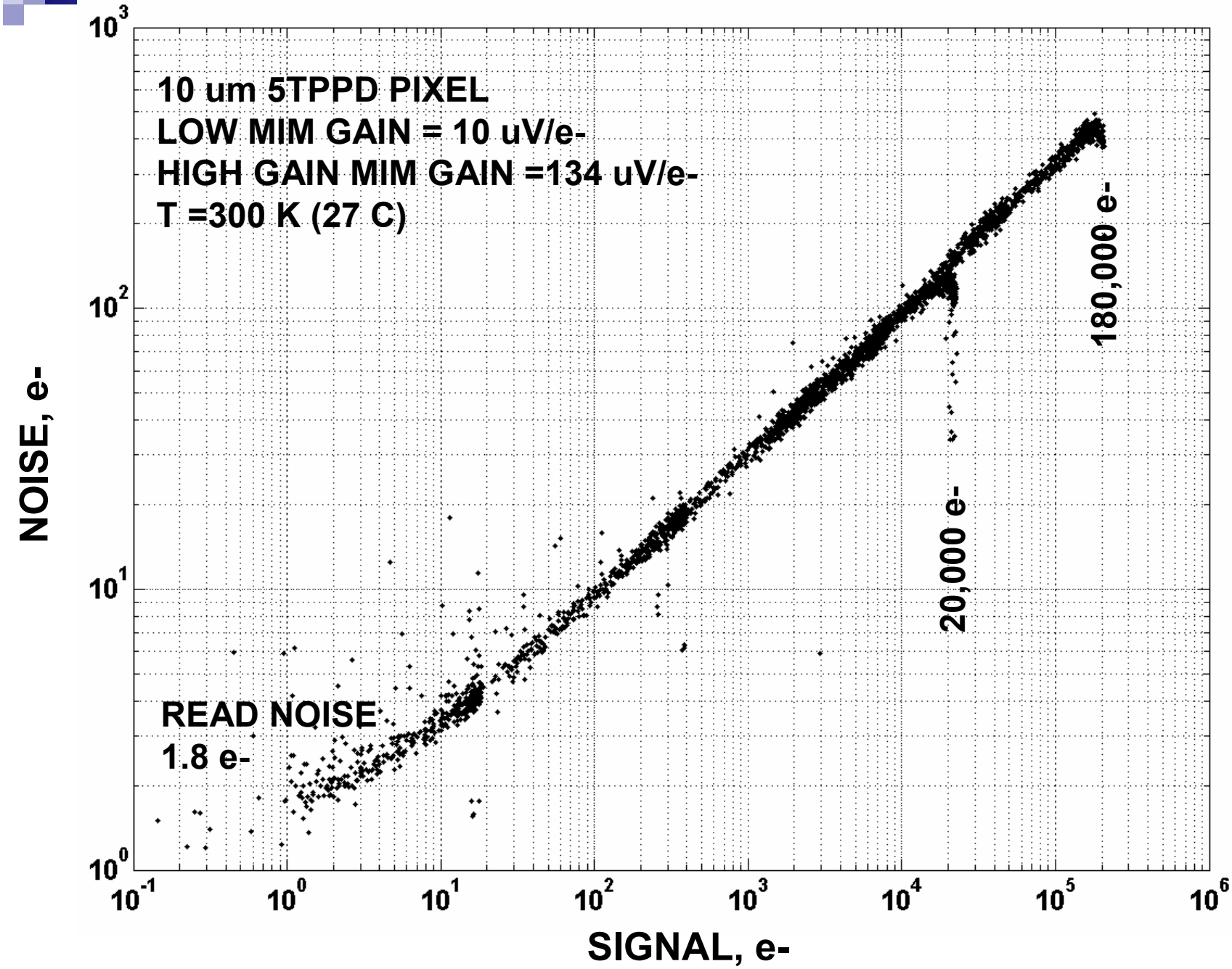
Mk x Nk IMAGER



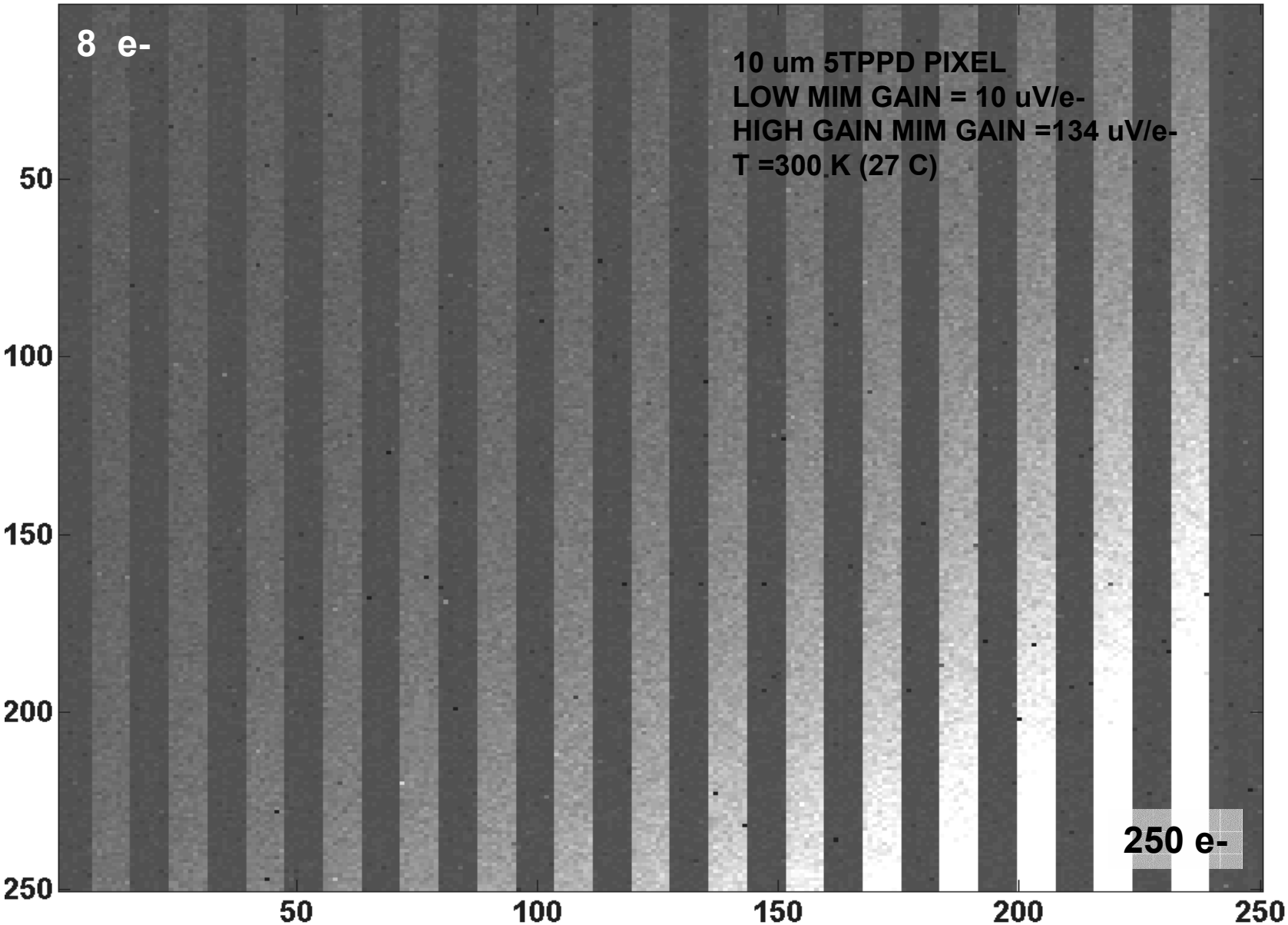


3840 x 4096 x 10 um 5TPPD
SOLOHI IMAGER

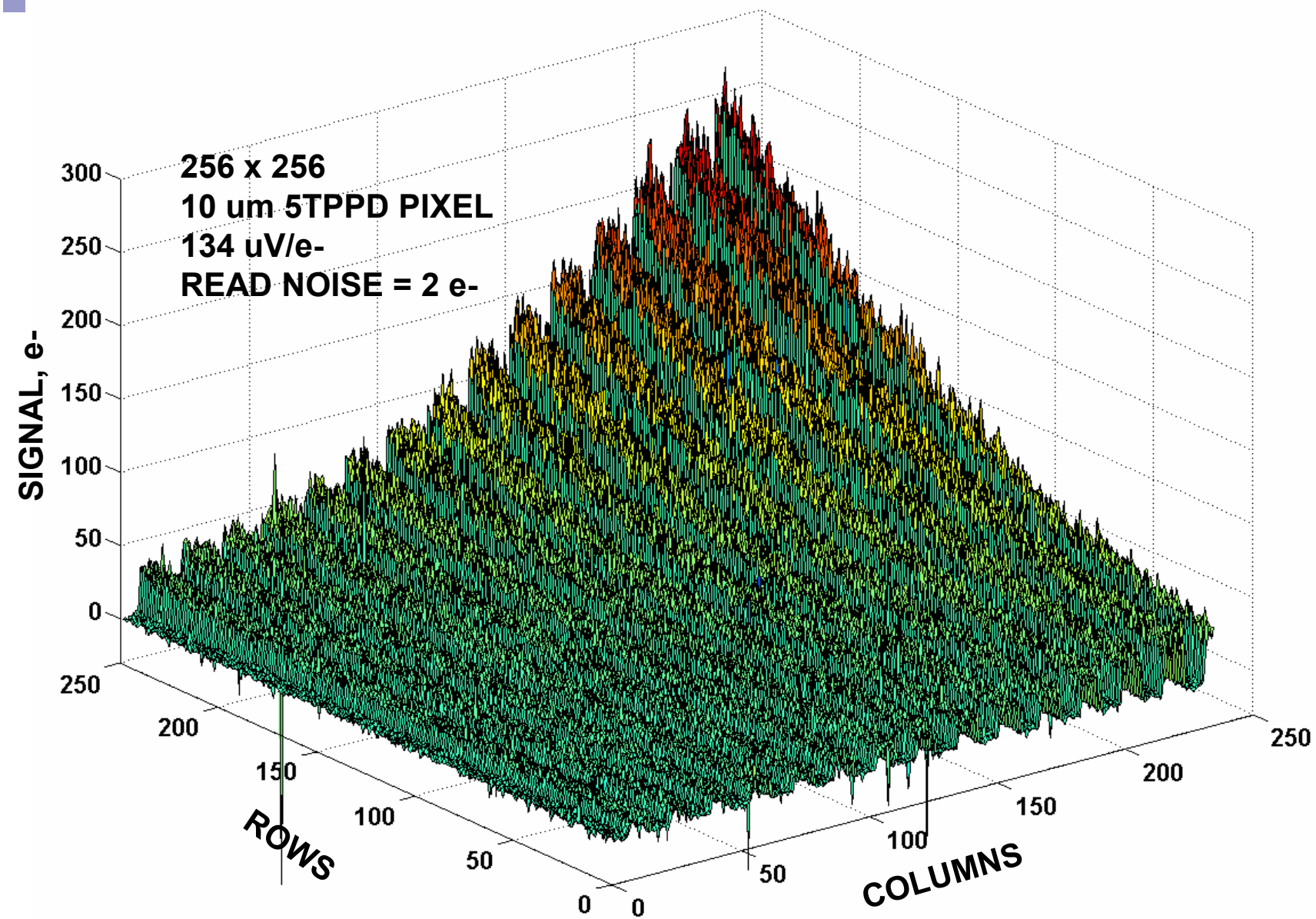
Mk x Nk 10 um PIXEL



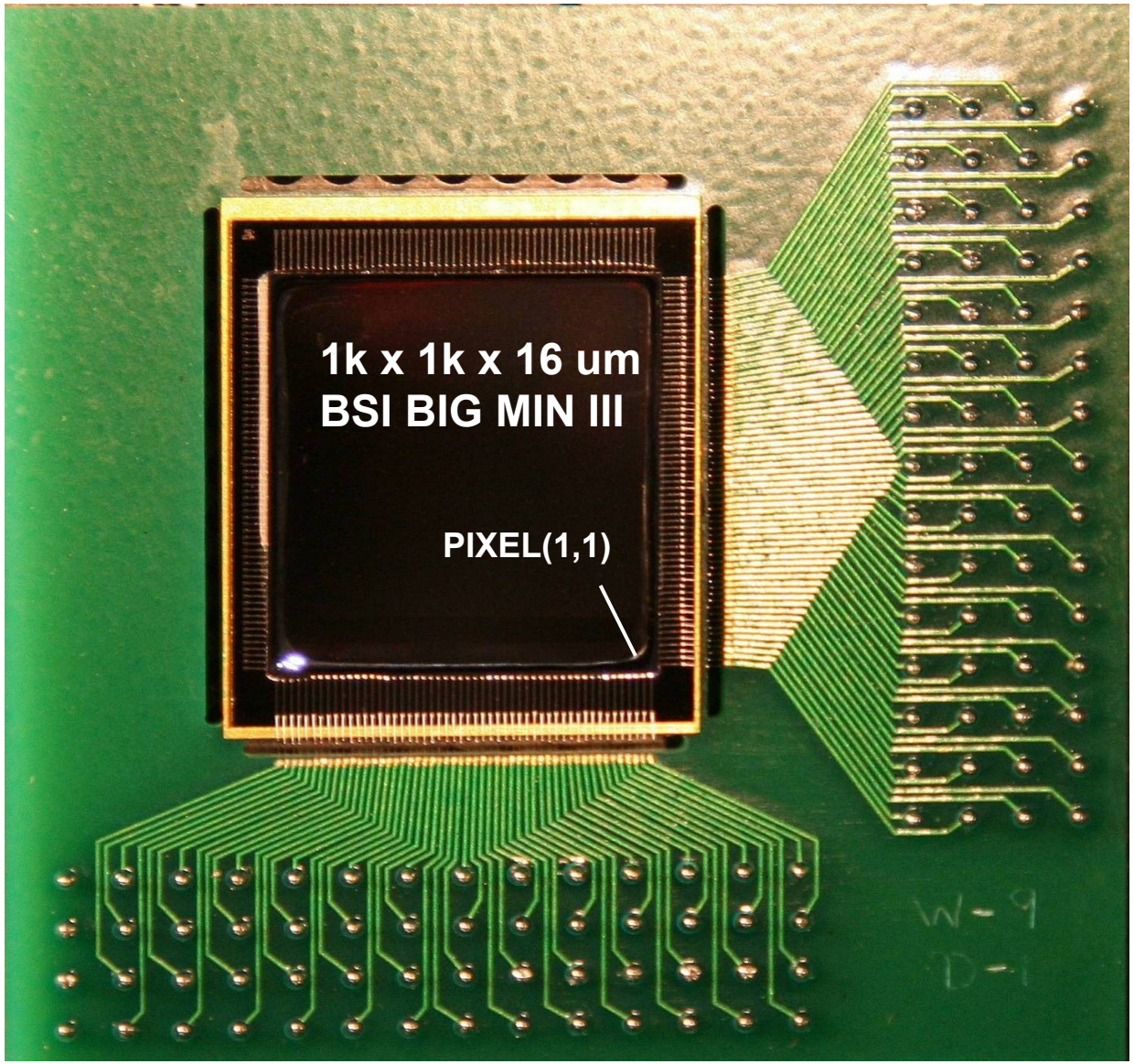
LOW LIGHT IMAGERY



LOW LIGHT IMAGERY



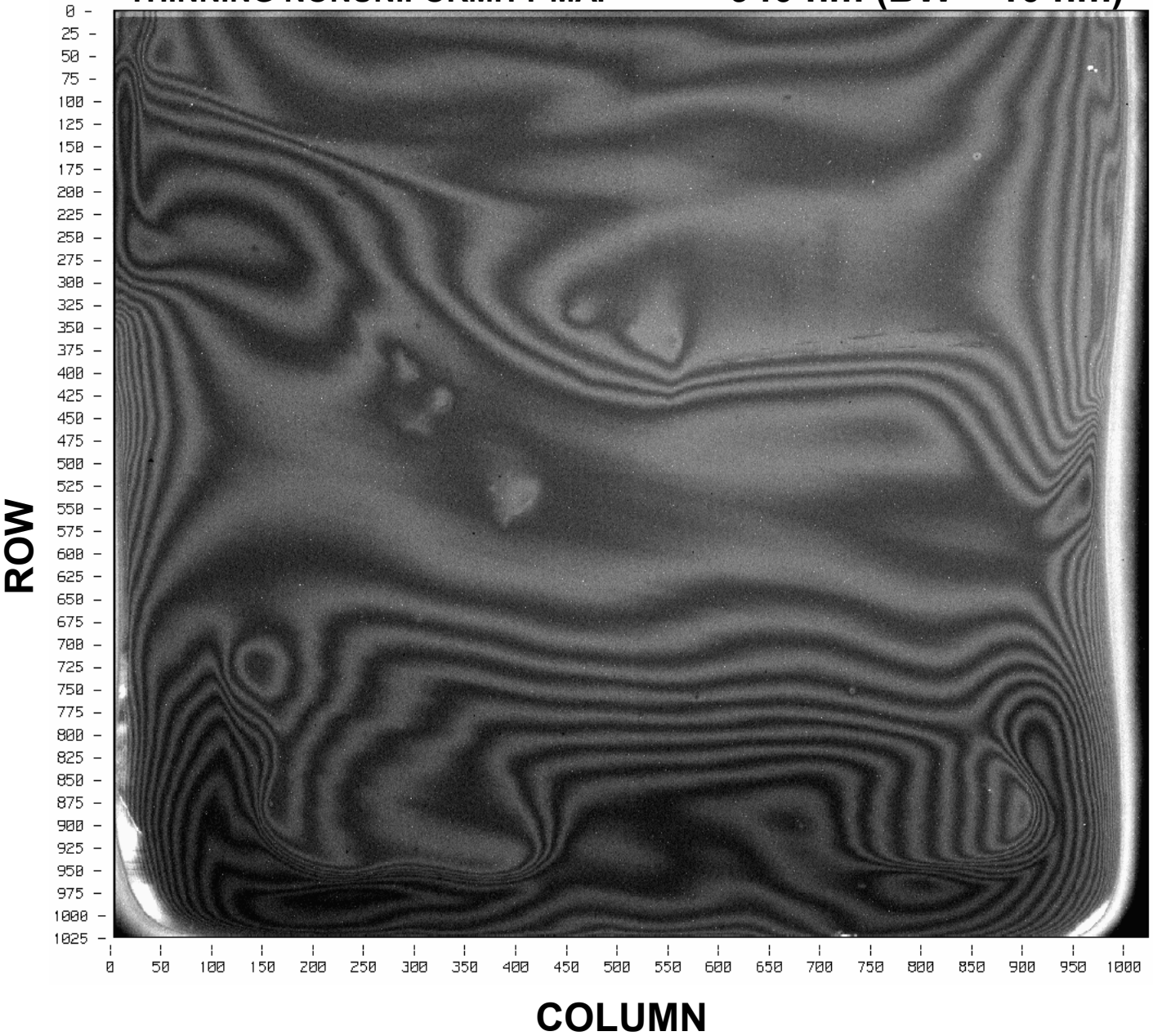
BACKSIDE ILLUMINATION

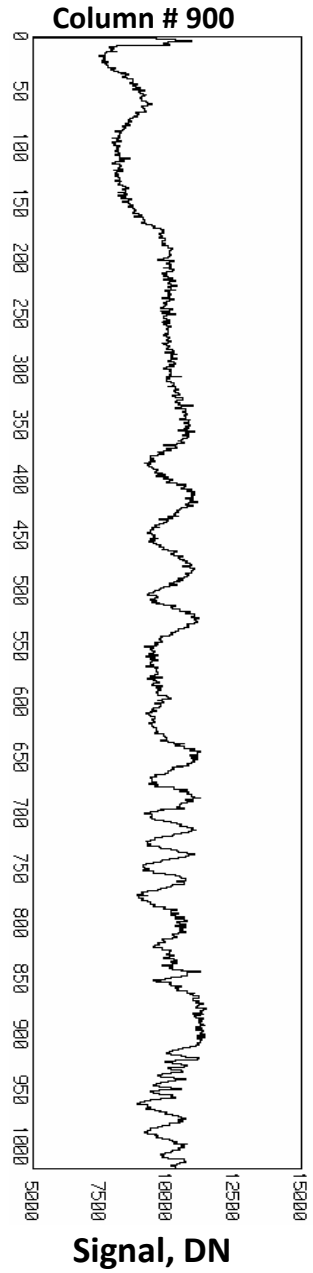


BACKSIDE ILLUMINATION

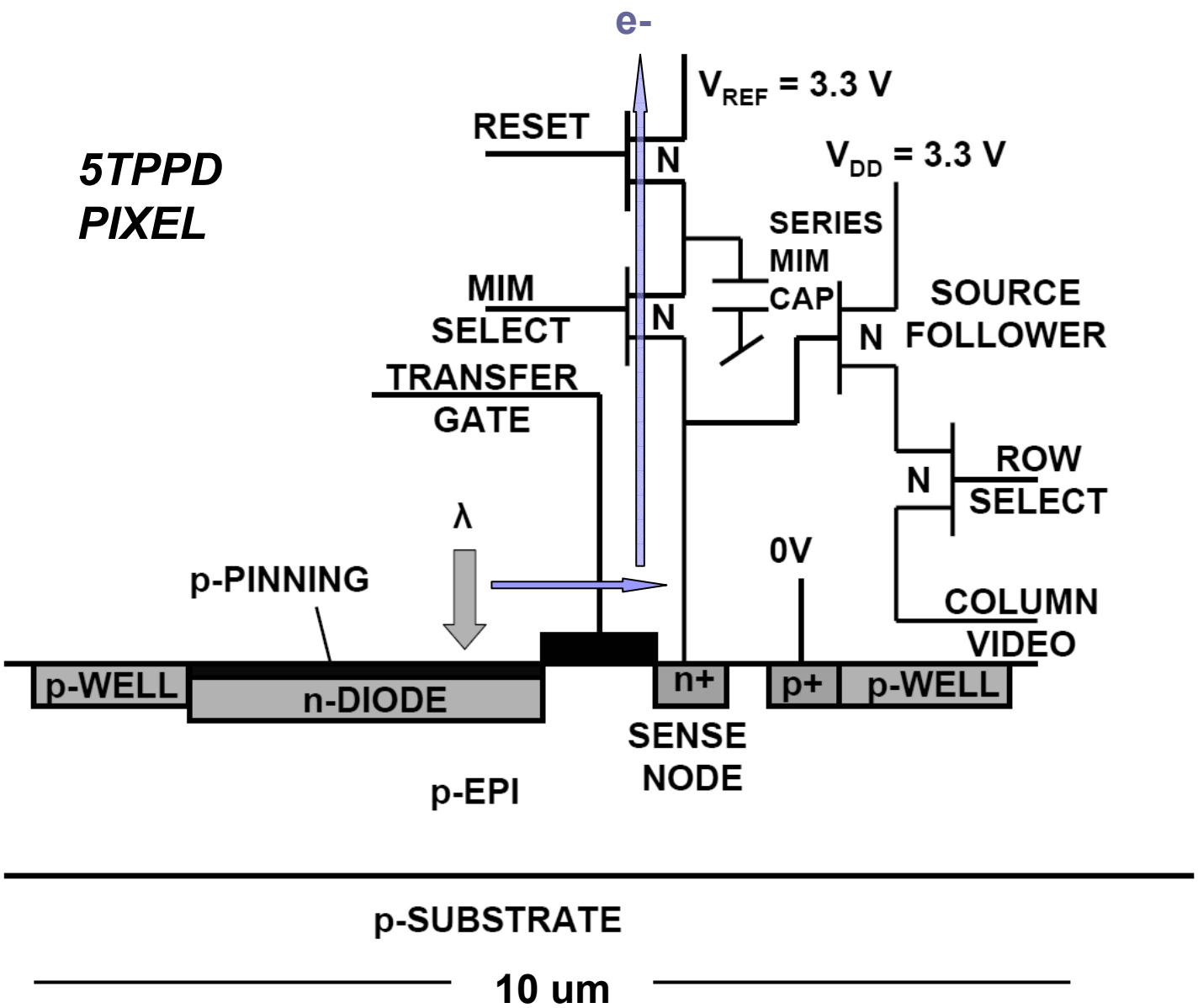
THINNING NONUNIFORMITY MAP

940 nm (BW = 10 nm)

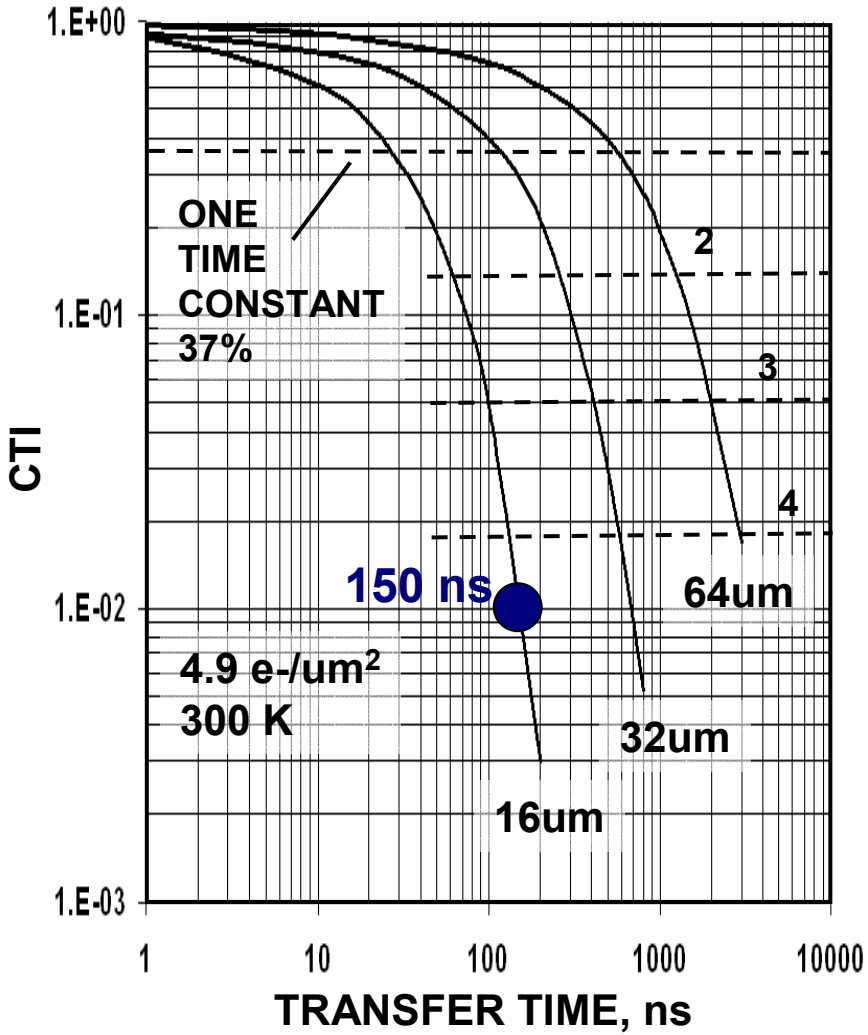




GLOBAL PIXEL ERASURE TIME

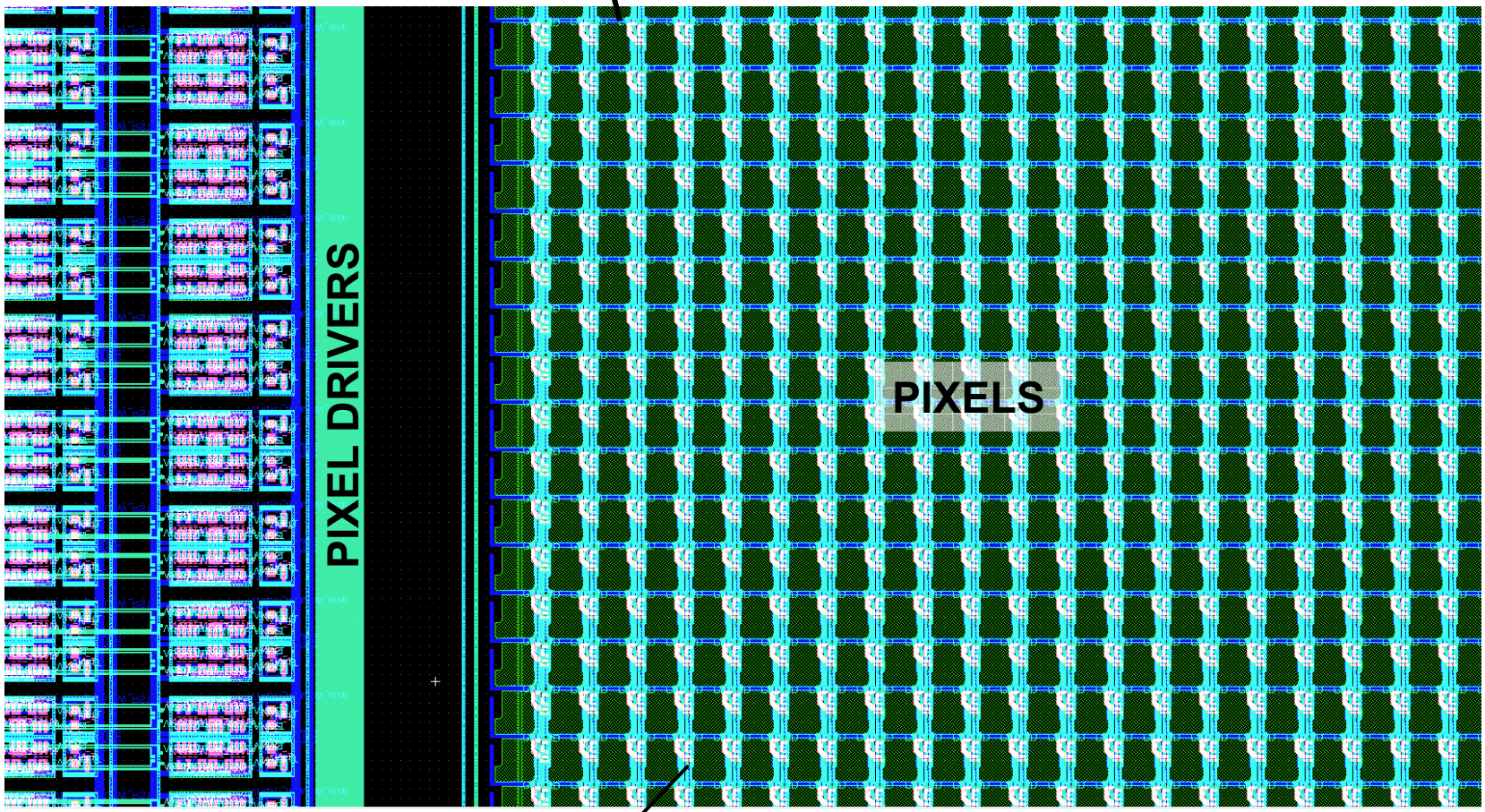


IDEAL PIXEL TRANSFER TIME



GLOBAL ERASURE TIME

TRANSFER GATE BUS (~ 0.8 ohms/pixel, 10 fF/pixel)



V_{REF} BUS (~ 0.8 ohms/pixel)

T=100 ns
COLUMN 4096

Mk x Nk STATUS

DESIGN IS COMPLETE FOR FABRICATION

WAFER PROBE , PACKAGE AND TEST SET ARE READY

…… .TO COMPLETE THE JOB

THANKS FOR LISTENING. .