IPHC
Institut Pluridisciplinaire
Hubert CURIEN
STRASBOURG

Ultimate MIMO★

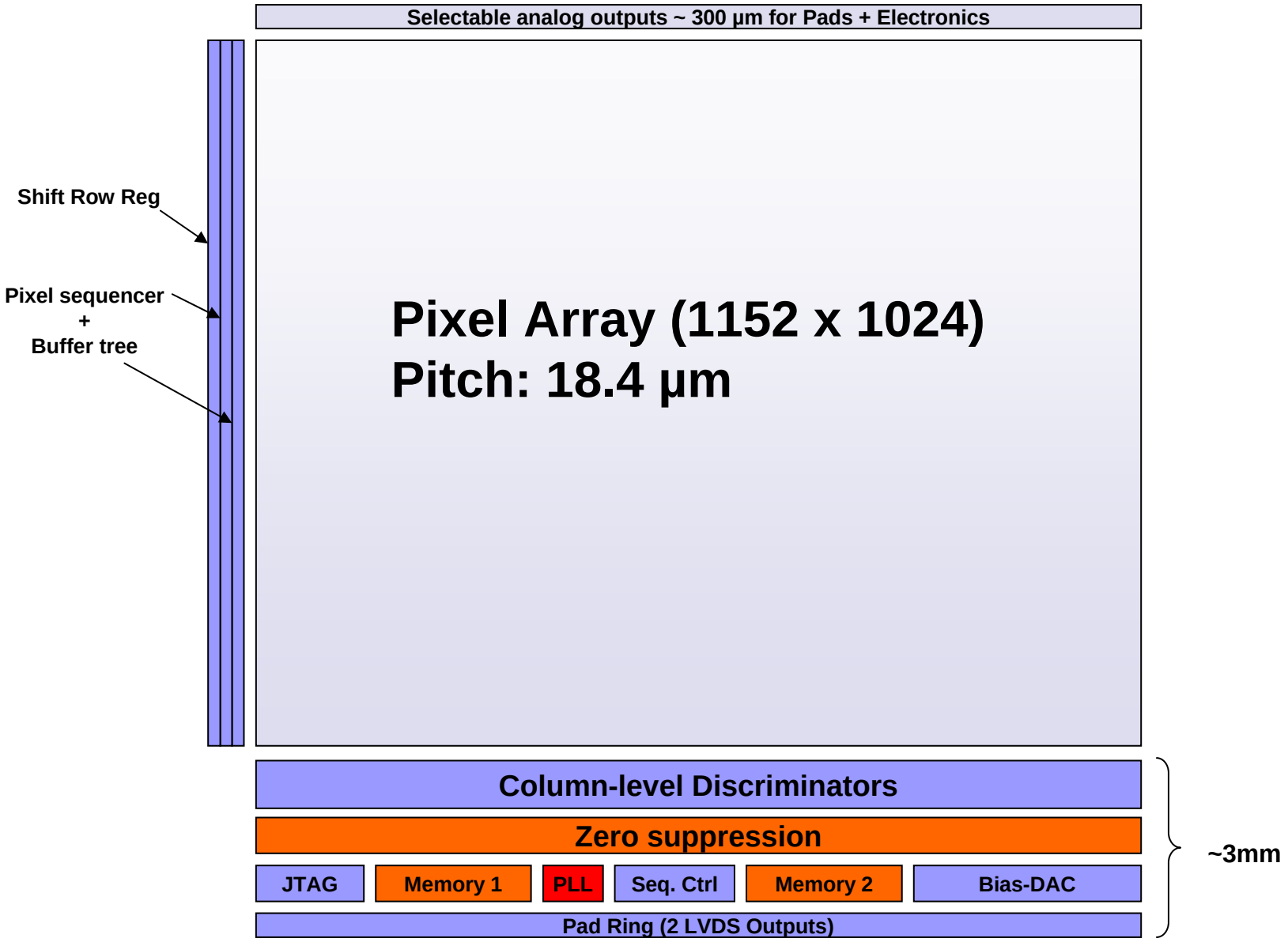
STAR

CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

IN2P3
INSTITUT NATIONAL DE PHYSIQUE NUCLÉAIRE ET DE PHYSIQUE DES PARTICULES

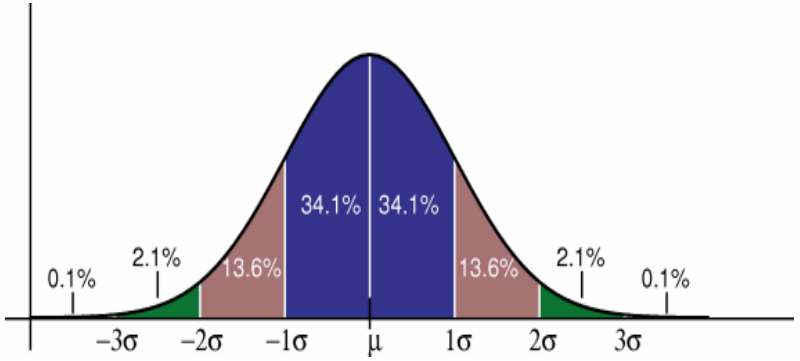
ulp UNIVERSITÉ LOUIS PASTEUR STRASBOURG

Ultimate Chip Floor Plan



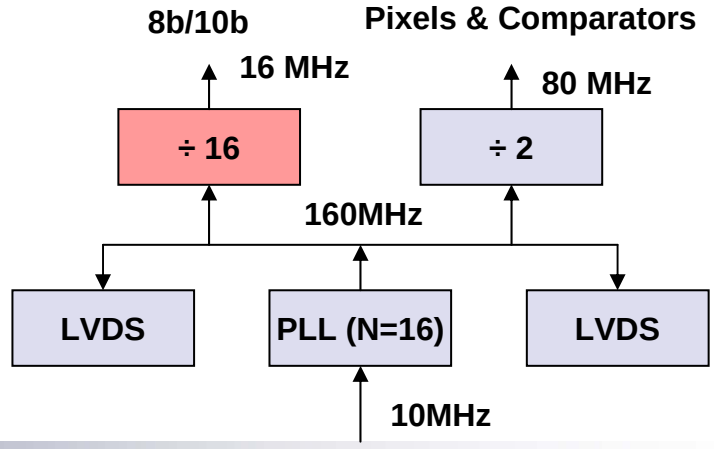
SUZE condition

- **Physics condition:**
  - The highest luminosity expected at STAR for RHIC2 gives:
    - 60 hits / cm^2 , σ = 8 hits
    - On the inner layer of sensors in a 200 µs integration window.
  - This rate is for interactions and peripheral collisions. Possible background sources are not included.
- **New memory : 2 x 48 KBits**
  - 1 for frame N, 1 for frame N-1
  - Capability of storing per frame:
    - 450 hits + 150 Noisy pixels
      - > 5σ & ~5 x10^{-4} noisy pixels
- **Output Freq. ~ 240 Mbits/s**
  - LBNL required 2 LVDS pads
    - ~ 120 MBits/s

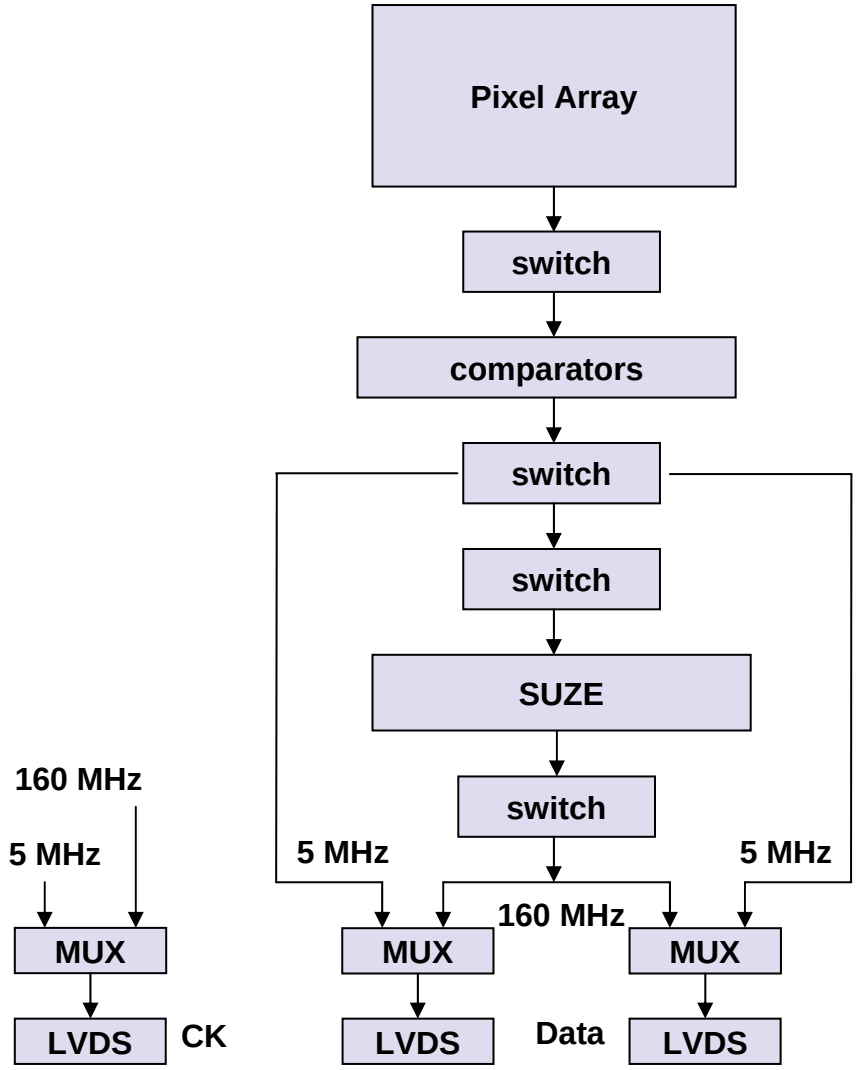


Frequency distribution

- **Circuit needs:**
  - **CK :** **80 MHz**
  - **Pixels & Comparators:** **16 CK ➔ 5 MHz**
  - **SUZE CK:** **80 MHz**
  - **LVDS out:** **2 x 120 MHz ➔ 2 x 160 MHz!!!**
- **Input Freq.: 10 MHz, PLL (N=16) output Freq.: 160 MHz**
- **80 MHz will be made in chip**
- **Possibility to integrate 8b/10b encoding to allow reasonable clock recovery**
  - **NOT for the Ultimate1 chip!!!**



Ultimate Sensor Testing Functionality



Inject 2 Test Voltages to emulate pixels outputs

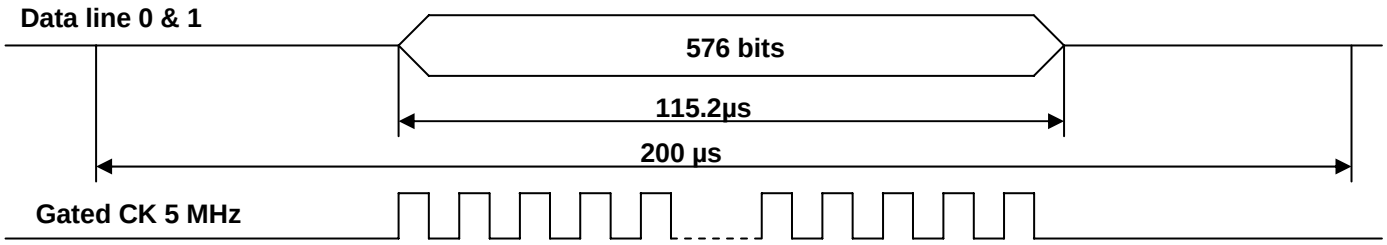
Read One Row Register, Pixels & Comparators are in normal mode, t_{int} = 200µs, Readout freq. = 5 MHz via 2 LVDS output pads. The auto increment functional logic to scan whole matrix will be studied.

Inject 2 SUZE Test Rows

Inject Test Pattern of 32 bits to emulate memory outputs

Data format

- **Read 1 row register at 2 x 5 MHz**



- **2 x 160 MHz outputs:**