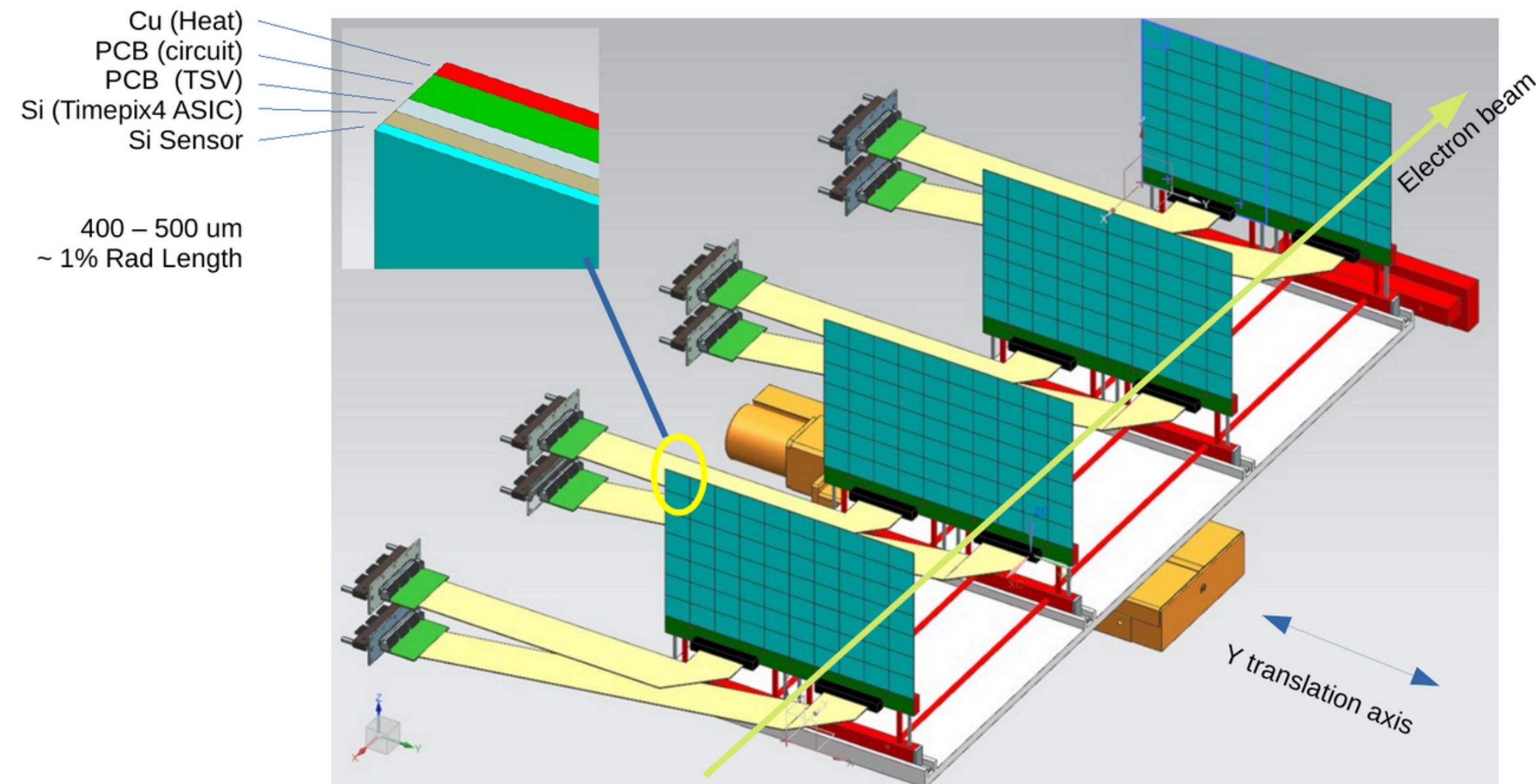


# LOW-Q2 SETUP

## Tracker

4 tracking layers per Tagger station (30 cm apart – still being optimised)



Sensor: Timepix4 + Si Hybrids.

**Pixel size:** 55x55 um. 448 x 512 pixels per sensor. Area = 6.94 cm<sup>2</sup>

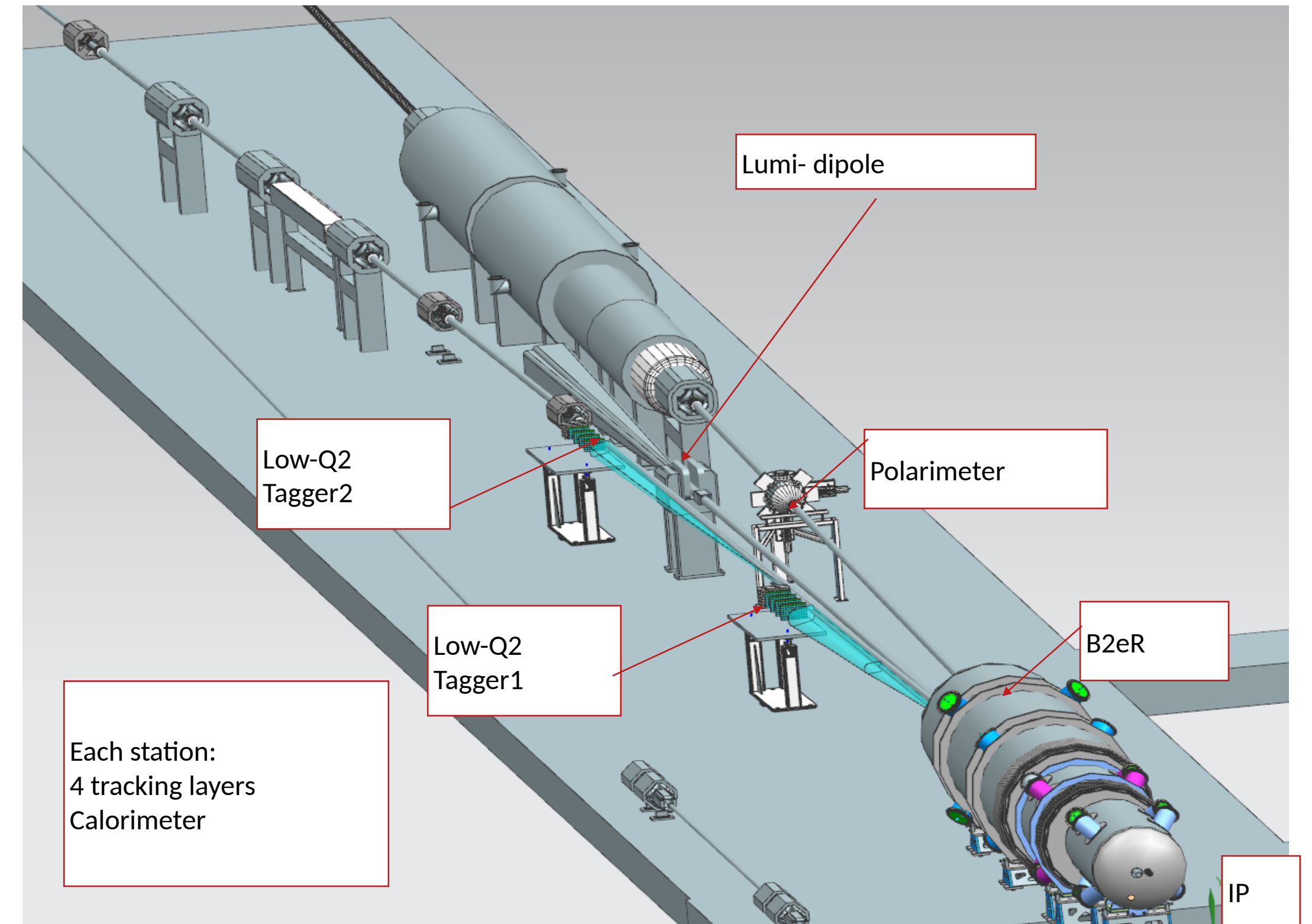
**Timing resolution** 2ns.

**Singles** rate capability high > 20kHz per 55um pixel

## Calorimeter

PbWO4 (?) towers 2x2x20 cm

Total size 26x24cm



**Low material budget** in front of the setup

**2 Si-stations** ( outside of the primary vacuum)

... but Timepix is designed to operate under 10<sup>-6</sup> mbar vacuum

working on **possible setup with detector sitting in the secondary vacuum**

Timepix already **demonstrated in high vacuum** (10<sup>-11</sup> mbar) for beam diagnostics

Location: Tagger 1 23.7 - 24.7 m

Tagger 2 35.7 - 36.7 m

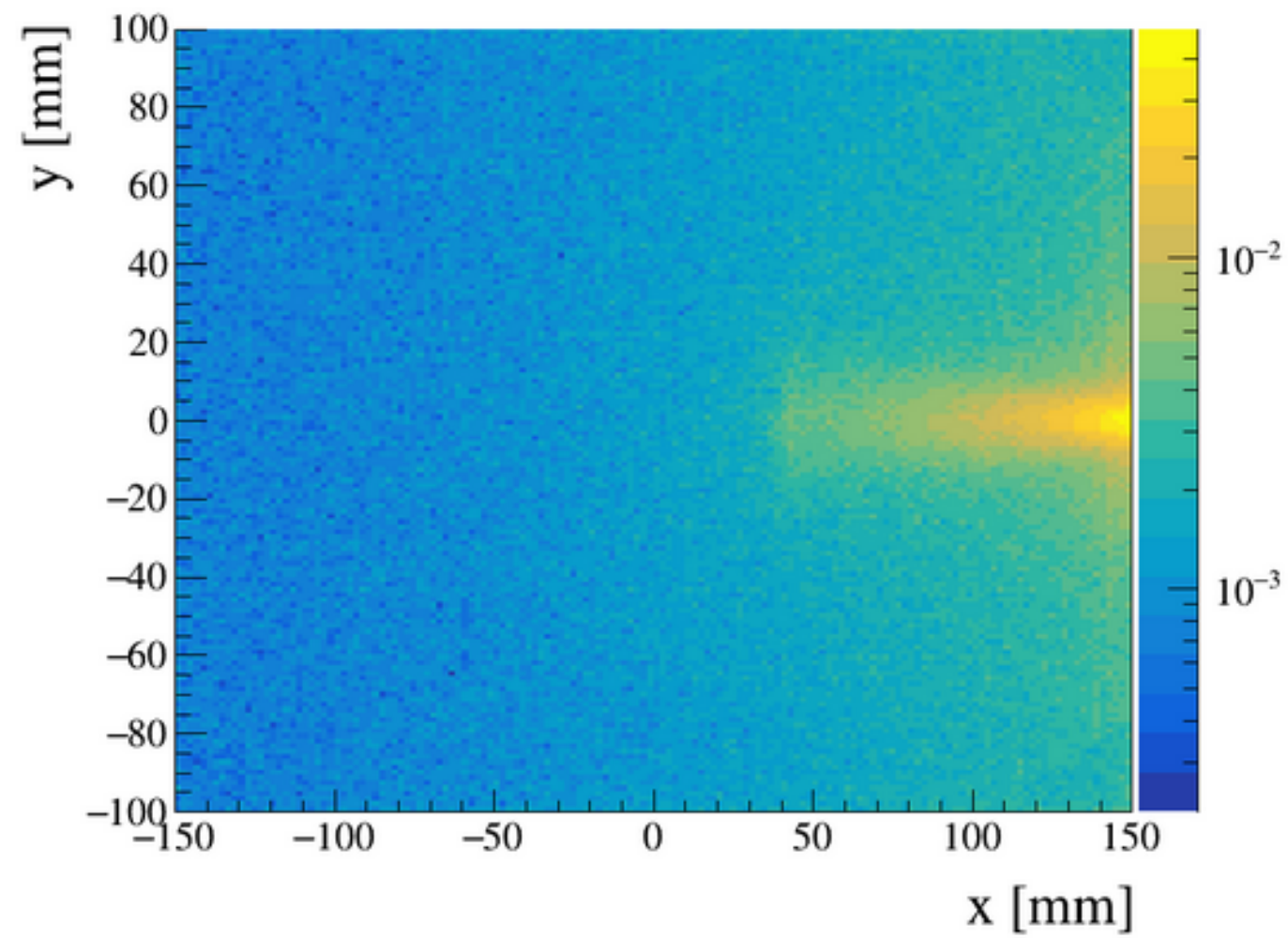
# TIMEPIX3 WP – Status May 2023: **Timepix4 tracker rates from Geant4**

## Timepix4 tracking layer design

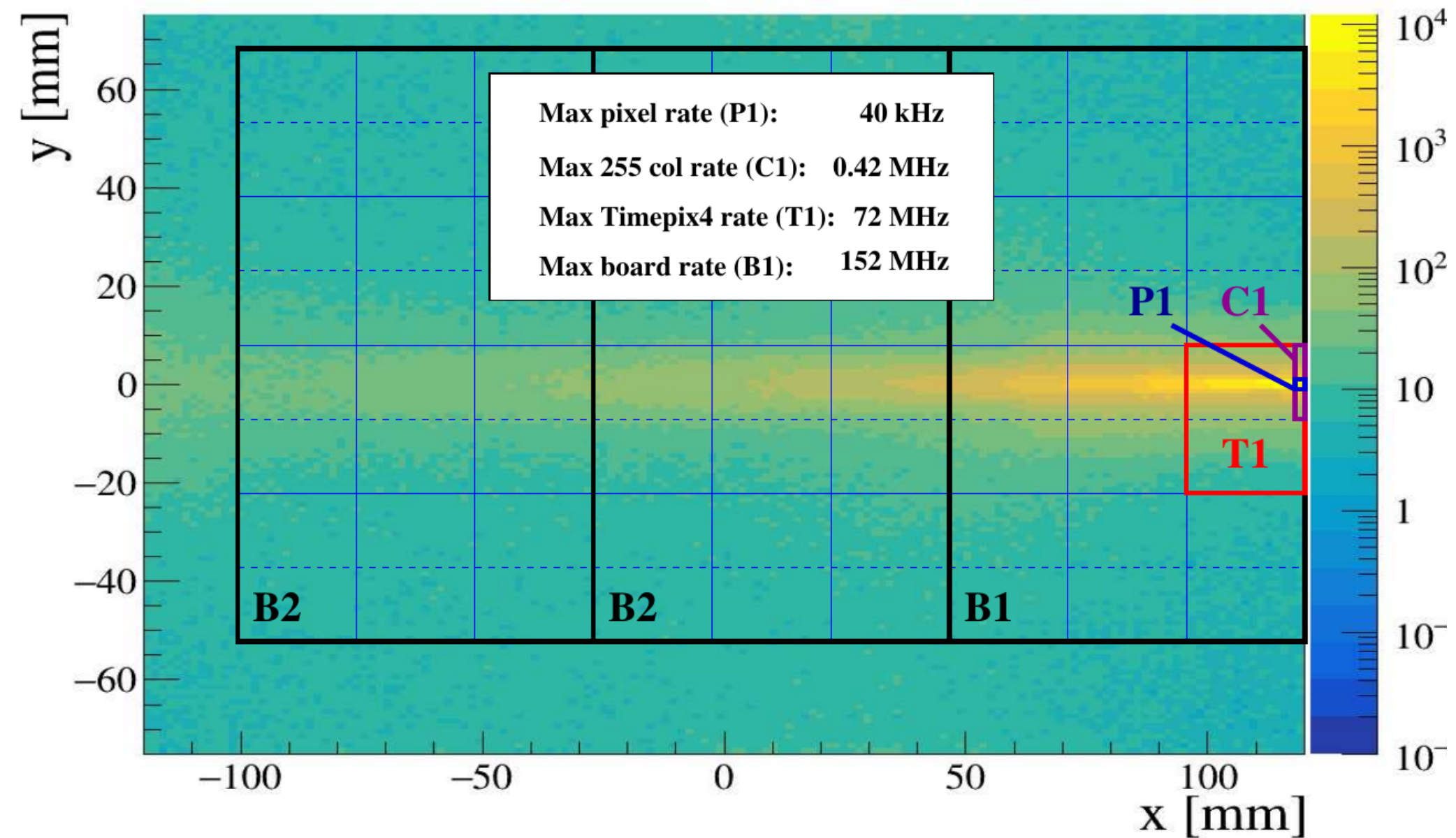
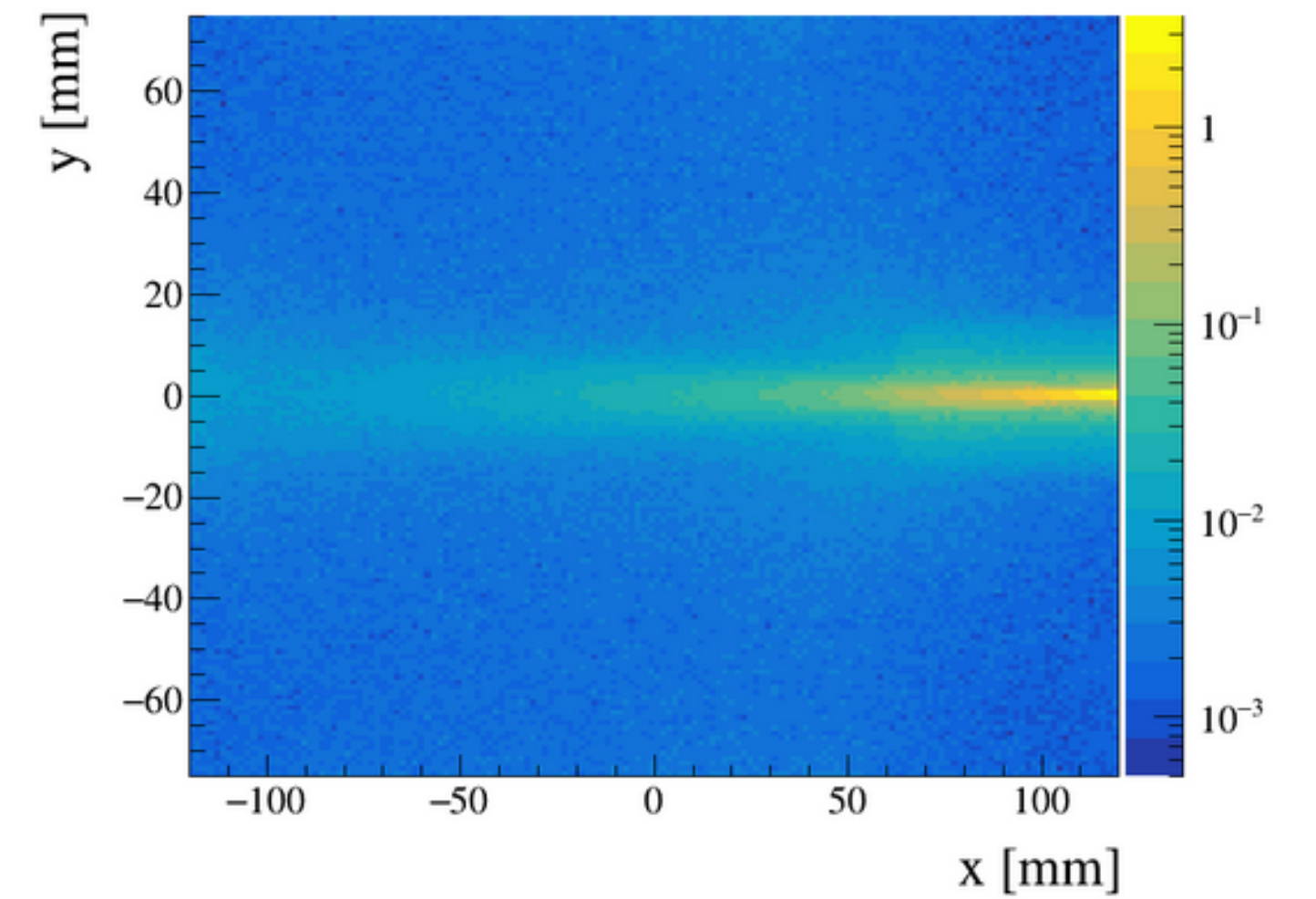
4 layers per tagger (2 taggers)  
3 boards per layer  
12 Timepix4 per board

66M pixels  
Max board bit rate: 115 Gb/s  
Reduced DAQ rate: 20Gb/s

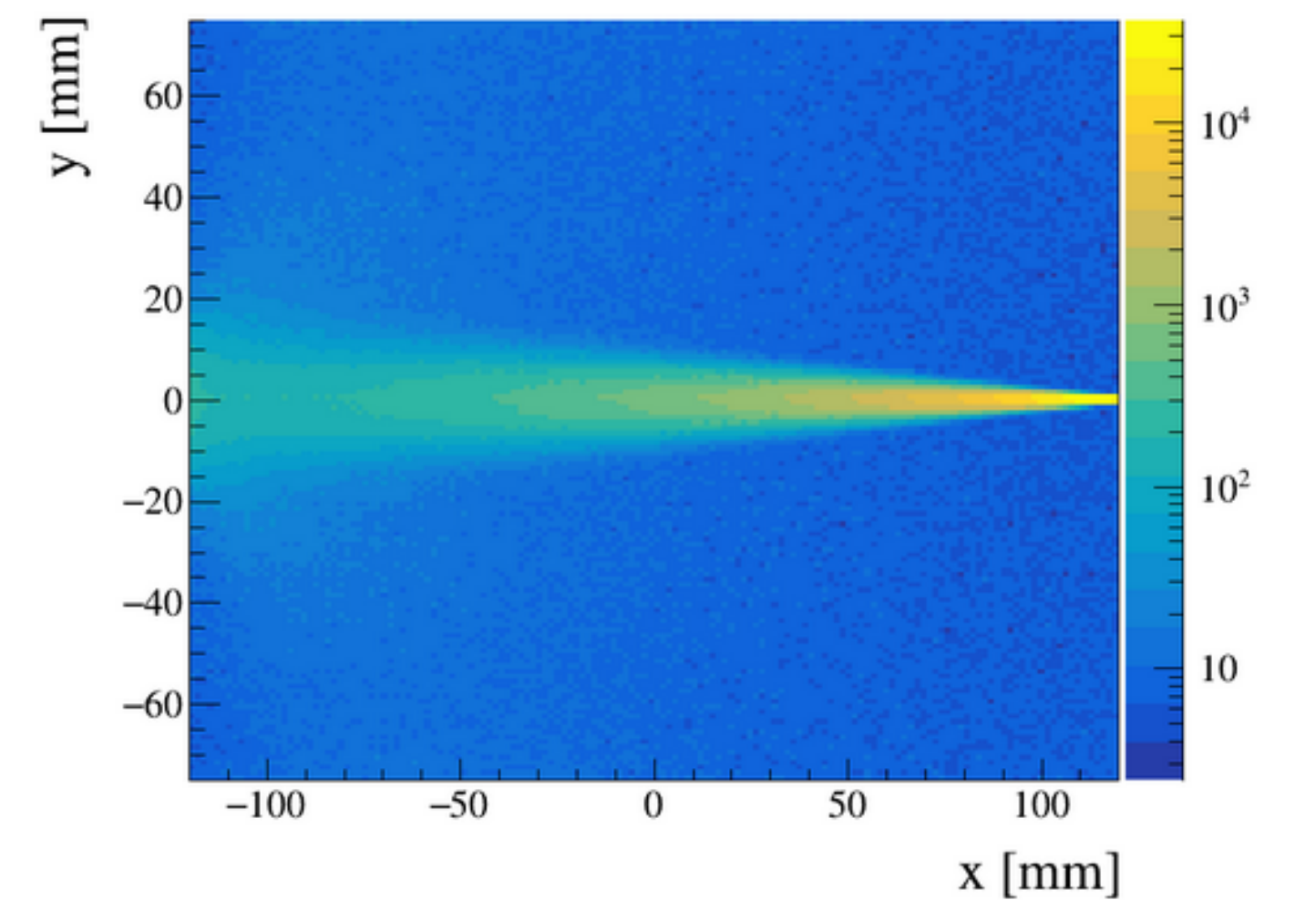
Tagger 1 QR Hit Distribution [Hz/ 55 $\mu$ m pixel]



Tagger 2 QR Hit Distribution [Hz/ 55 $\mu$ m pixel]



Tagger 2 Brem Hit Distribution [Hz/ 55 $\mu$ m pixel]



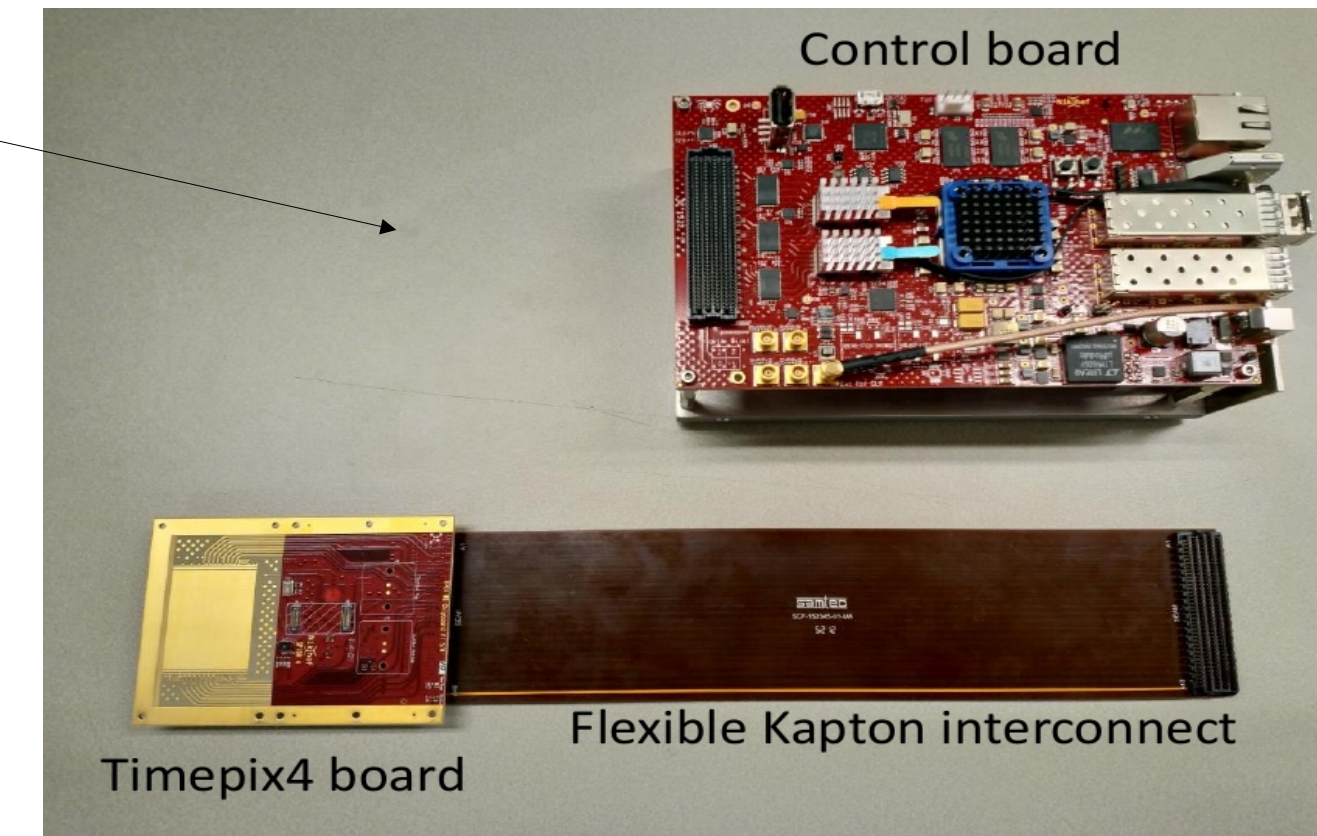
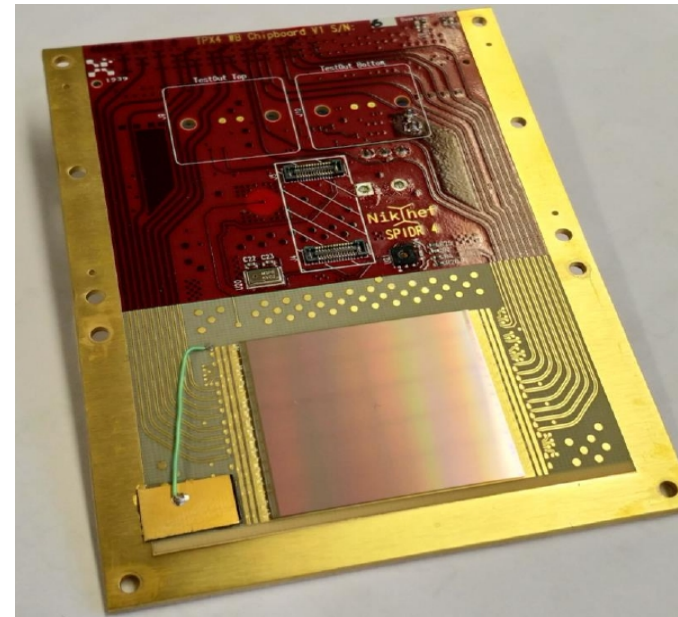
# TIMEPIX3 WP – Status May 2023: **Timepix4 + SPIDR4 Design and prototype**

## Timepix4 tracking layer design

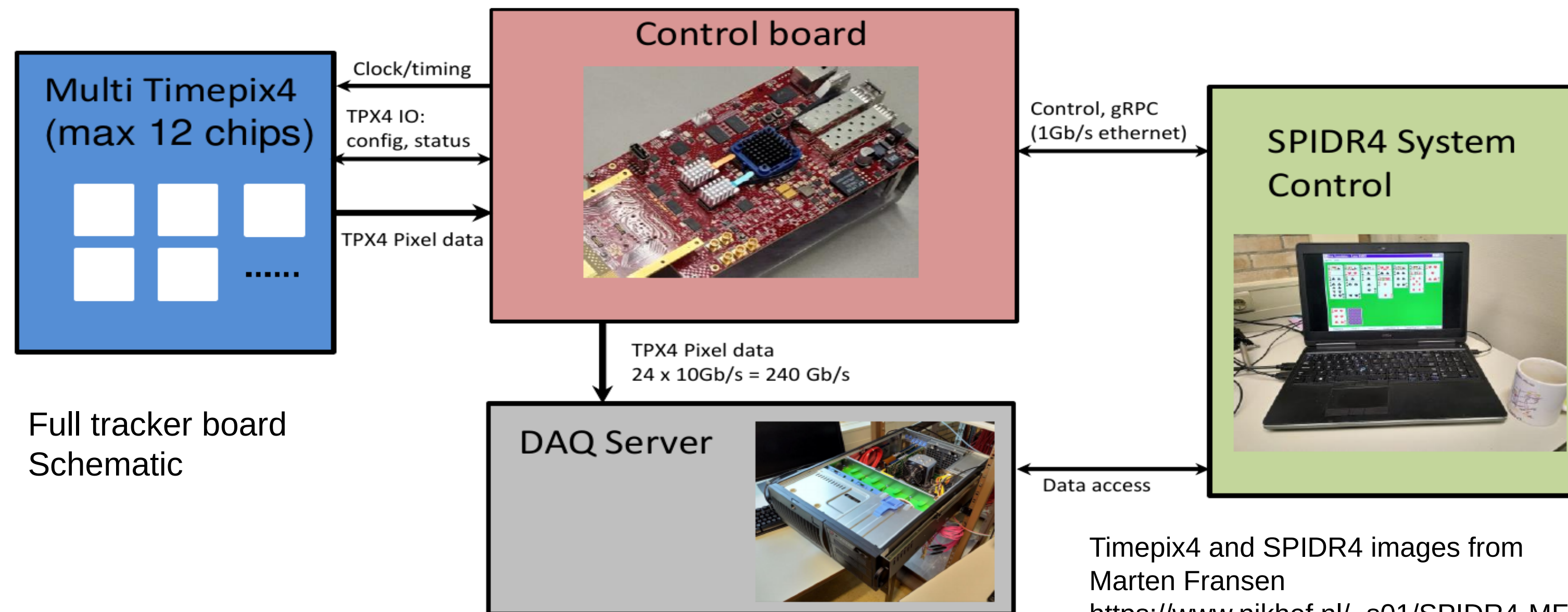
4 layers per tagger (2 taggers)  
 3 boards per layer  
 12 Timepix4 per board

66M pixels  
 Max board bit rate: 115 Gb/s  
 Reduced DAQ rate: 20Gb/s

Prototype tracker based on:  
 2 x Timepix4 + SPIDR4  
 (Expected from Sept 2023)



SPIDR4: Multi chip, 2 x 10 Gb/s per TPX4 chip





Full tracker board Schematic



Timepix4 and SPIDR4 images from Marten Fransen  
<https://www.nikhef.nl/~s01/SPIDR4-MF-GP-apr2020.pdf>

# Far-backward contributions



## Low-Q2 tagger - tracker :

Glasgow, UK   
W&M, USA ( ? ) 



## Low-Q2 tagger - calorimeter :

York, UK   
Temple, USA ( ? ) 

## Lumi - photon calorimeter:

Kraków, Poland   
York, UK 

## Lumi - pair-spectrometer:

York, UK   
Houston, USA 

## Lumi - pair-spectrometer tracker:

??

