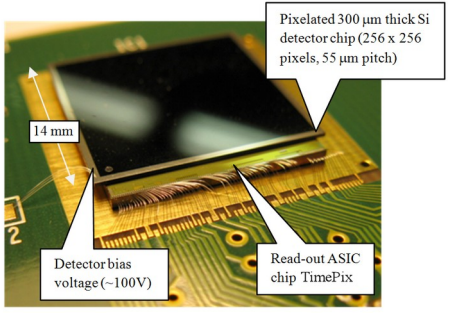
# Glasgow - Timepix4 in a Far Backward Detector

- We (Glasgow group) are already involved in EIC (ATHENA and ECC
  - But not yet focussed on any specific detector component
- Experience with detector development at Jlab, Mainz, Lund
  - Detector development, construction, slow controls
  - Data analysis, DAQ, simulation
  - Tagging
- Current projects with Timepix3
  - Polarimeter for lin pol photons
  - RFPMT for picosecond timing
- UK Infrastructures bid for EIC
  - Glasgow component:
  - to investigate Timepix4
  - for potential use at EIC
- Could timepix4 have a role in a far backward detector
- ….. or anywhere else at EIC?




Timepix3

## Timepix3 vs Timepix4

Timepix4: A 4-side tillable large single threshold particle detector chip with improved energy and time resolution and with high-rate imaging

| | | | Timepix3 (2013) | Timepix4 (2019) | |
|---|---|---|---|---|---|
| Technology | | | 130nm – 8 metal | 65nm – 10 metal | |
| Pixel Size | | | 55 x 55 µm | 55 x 55 µm | |
| Pixel arrangement | | | 3-side buttable 256 x 256 | 4-side buttable 512 x 448 | 3.5x |
| Sensitive area | | | 1.98 $cm^2$ | 6.94 $cm^2$ | |
| Readout Modes | Data driven (Tracking) | Mode | TOT and TOA | | |
| | | Event Packet | 48-bit | 64-bit | 33% |
| | | Max rate | 0.43x$10^6$ hits/$mm^2$/s | **3.58x$10^6$ hits/$mm^2$/s** | |
| | | Max Pix rate | 1.3 KHz/pixel | **10.8 KHz/pixel** | 8x |
| | Frame based (Imaging) | Mode | PC (10-bit) and iTOT (14-bit) | CRW: PC (8 or 16-bit) | 10x |
| | | Frame | Zero-suppressed (with pixel addr) | Full Frame (without pixel addr) | 5x |
| | | Max count rate | ~0.82 x $10^9$ hits/$mm^2$/s | ~5 x $10^9$ hits/$mm^2$/s | 8x |
| TOT energy resolution | | | < 2KeV | **< 1Kev** | |
| Time resolution | | | 1.56ns | **~200ps** | |
| Readout bandwidth | | | ≤5.12Gb (8x SLVS@640 Mbps) | **≤163.84 Gbps (16x @10.24 Gbps)** | |



Xavier.llopart@cern.ch Medipix Symposium, Sept 2019

# Glasgow - Timepix4 in a Far Backward Detector ?

- Q1 Which is the contributions you can bring to the Far-Backward activity towards the proposal **in the next months**?
  - Add Timepix4 / pixel detectors to simulation. (Already in progress – Simon Gardner)

- Q2 What are the most relevant and urgent questions in the Far-Backward sector?
  - Decide optimal position / track / timing resolutions ?
  - What is available space, radiation environment ?
  - Maximising angular acceptance at large eta
  - Costs

- Q3 How do you see globally Far-Backward project for Detector 1
  - Quasi real photon beam with high flux for meson photoproduction and spectroscopy
  - Suppression of backgrounds in hard exclusive photoproduction processes

Currently involved:
Daria Sokhan (UK EIC infrastructure bid co-spokesperson), Ken Livingston (Timepix3 + DAQ development), Derek Glazier (Simulation and analysis)
Simon Gardner (simulation, Timepix3 analysis tools), Dima Manuelski (Medipix and Timepix Guru)
Daresbury Cross-community support group (Timepix3 readout and DAQ)