

FITPix Data Preprocessing Pipeline for the Timepix Single Particle Pixel Detector

KRAUS Vaclav (IEAP CTU in Prague, University of West Bohemia in Pilsen)

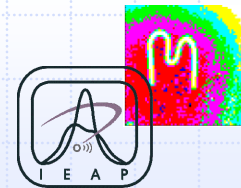
HOLIK Michael (IEAP CTU in Prague, University of West Bohemia in Pilsen)

JAKUBEK Jan (IEAP CTU in Prague)

GEORGIEV Vjaceslav (University of West Bohemia in Pilsen)

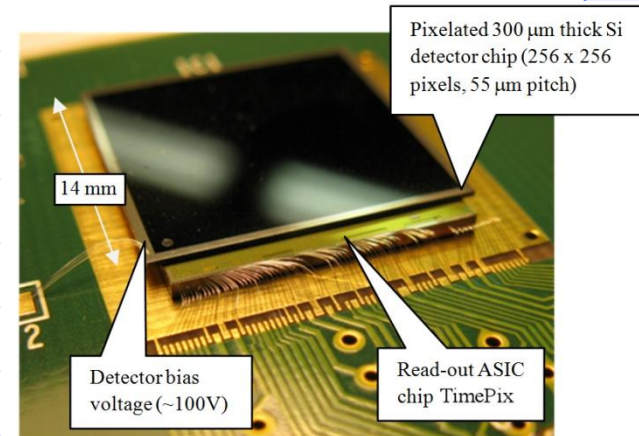


FITPix Data Preprocessing Pipeline for the Timepix Single Particle Pixel Detector

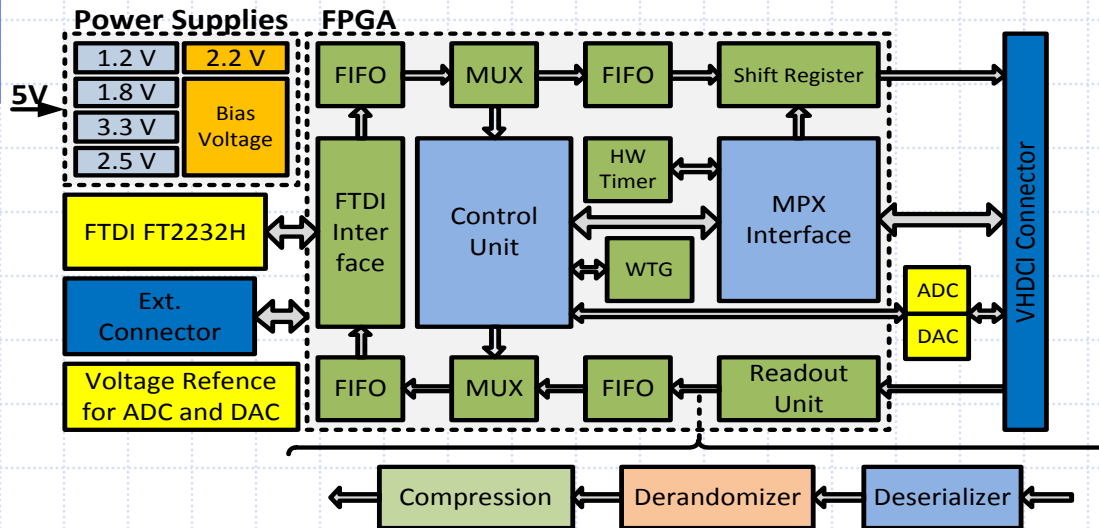
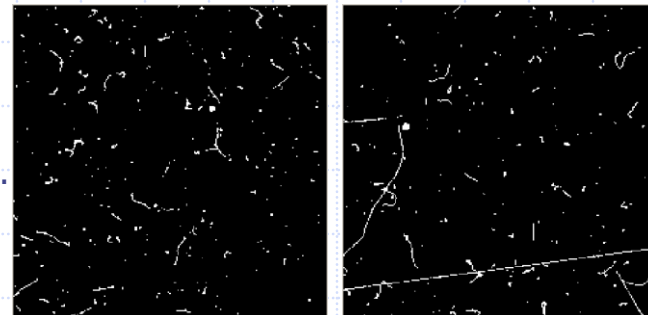


Motivation:

1. Long dead time.
2. The current FITPix do not contains some processing for the data.
3. The raw data from the detector cannot be used for processing.
4. Large amount of data from detector (high requirements for data channel).

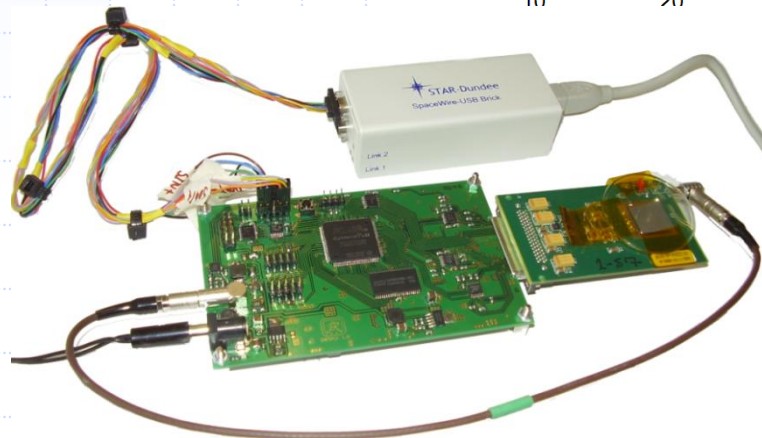
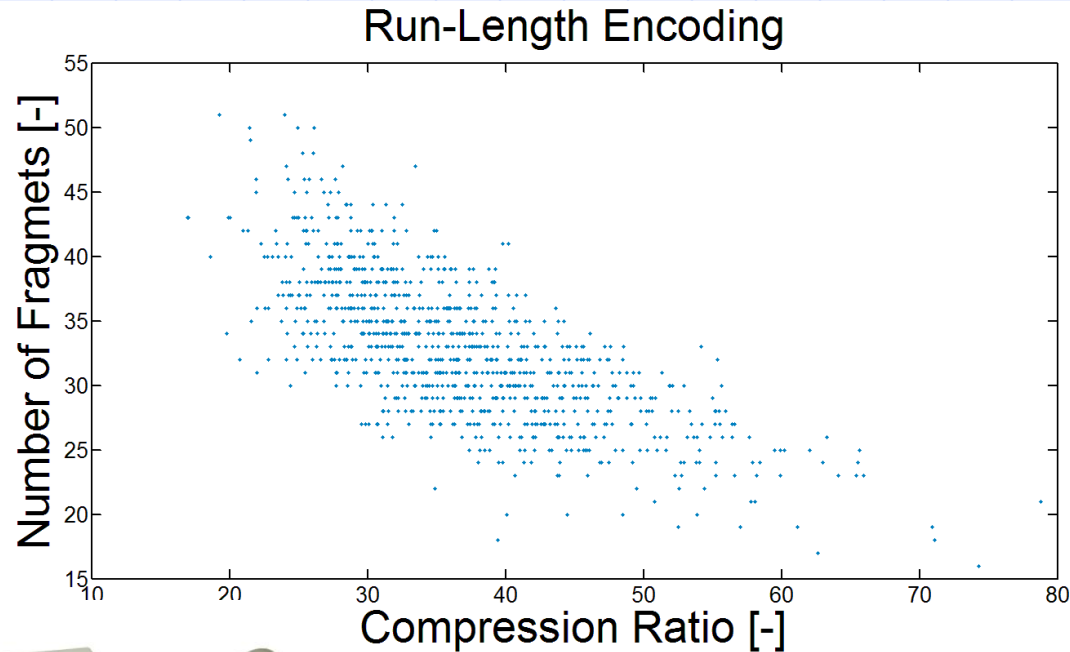
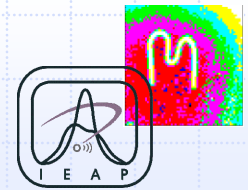


- 65536 pixels with pitch of 55μm
- Counting mode
- TOT mode
- Time arrival mode
- ≈ 0.9 Mb/frame
- Data-rate: Serial 100Mb/s, Parallel 3.2Gb/s



- **Parallel readout** has been implemented. Dead time is significantly decreased.
- **Deserializer** converts raw data to the matrix stream.
- **Derandomizer** converts pseudorandom values to *uint16*.
- **Compression** – Run-Length Encoding.

FITPix Data Preprocessing Pipeline for the Timepix Single Particle Pixel Detector



HW Block	Size in LE	Memory bits	f_{\max} [MHz]
<i>Deserializer (fast)</i>	11.100	0	128
<i>Deserializer (slow)</i>	1.400	7.168	153
<i>Derandomizer</i>	54	229.376	230
<i>Compression</i>	129	0	195