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粒子物理与粒子辐照
教育部重点实验室

Readout electronics for the MPW chip

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on behalf of SDU pixel group

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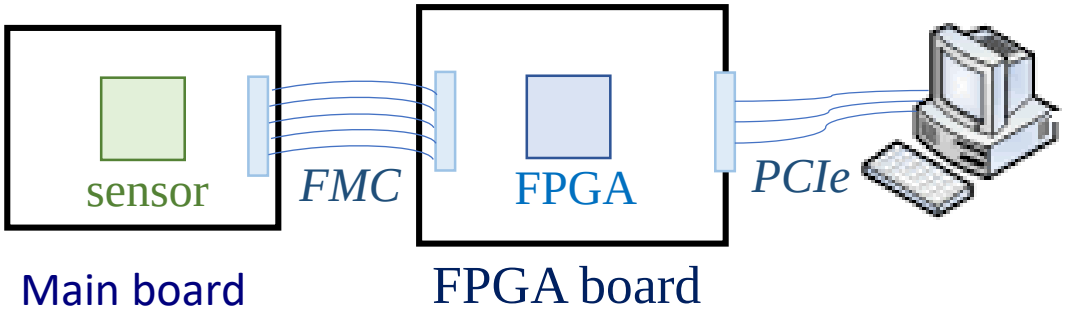
Outline

- **Structure of the readout electronics**
  - Main board with chip bonded, power supply, connectors to the outside, etc.
  - FPGA board with related configurations, data transmission, etc.
- **Status of the readout electronics**
  - The structure has been used for the test of SUPIX
- **Schedule of the test boards**
- **Summary & outlook**

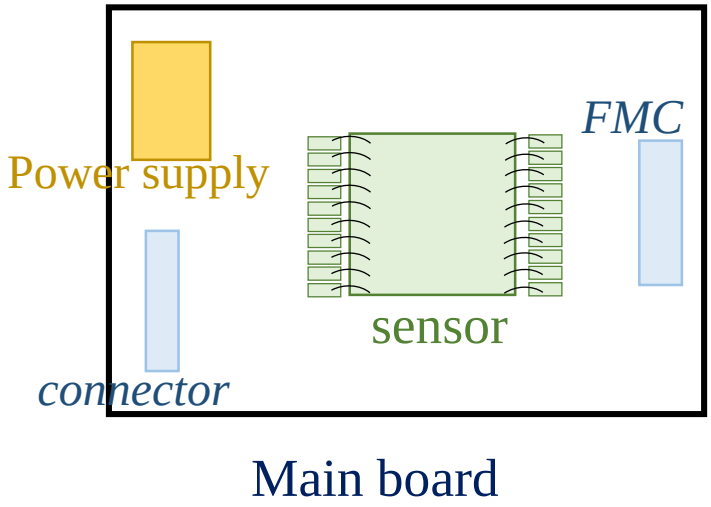
Structure of the readout electronics

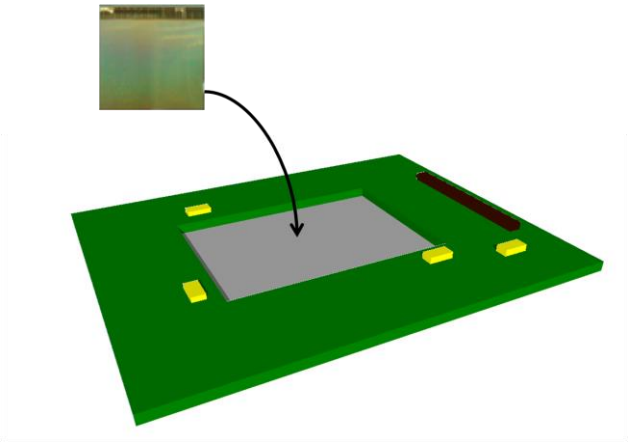


- **The test electronics for MPW consists of:**
  - Main board:
    - chip is bonded
    - supply the bias for the chip
    - the output is transmitted through buffers
    - supply the power to the chip
    - buffer the control signals
  - FPGA board (KC705 evaluation board):
    - communicate with PC via PCIe, control the data loading/receiving

Structure of the readout electronics

Main board

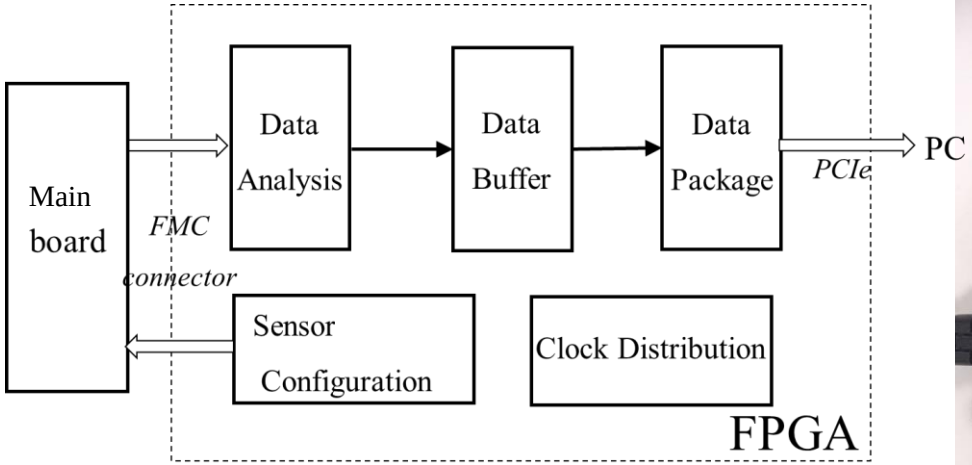


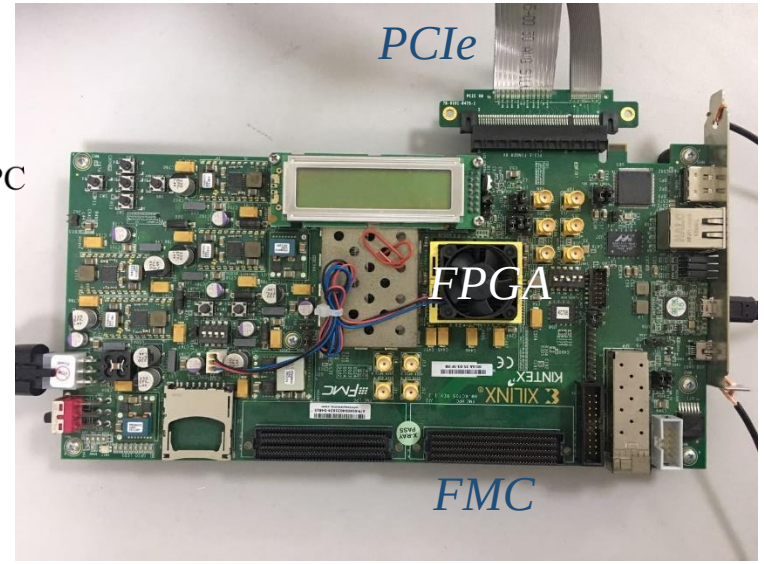


- **A pixel sensor is wire-bonded on the main board**
  - Signal readout
  - Data buffer
  - Data transmission to FPGA board
  - Power supply
  - Other circuits if needed

Structure of the readout electronics

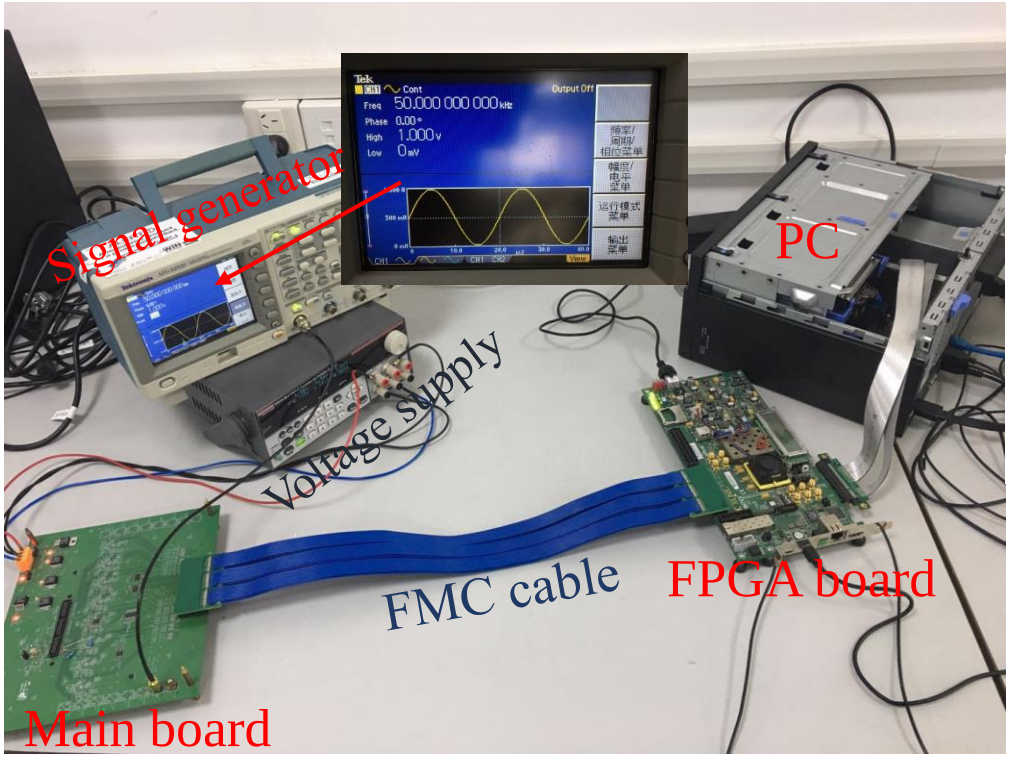
FPGA board

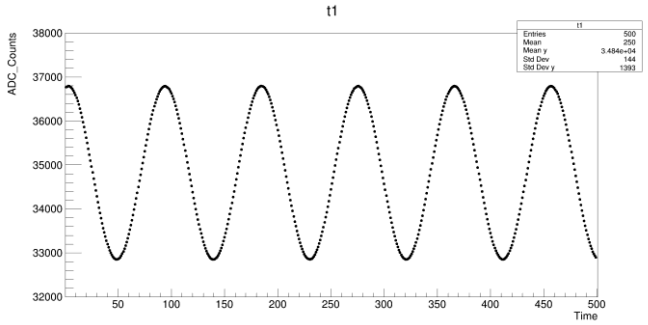




- **FPGA board receives (sends) data from (to) the main board**
  - KC705 evaluation board: Kintex-7 FPGA (XC7K325T)
  - Sensor configuration
  - Data analysis, data buffer & data package
  - Data transmission to PC over PCI express

Status of the readout electronics





Data acquired from PC

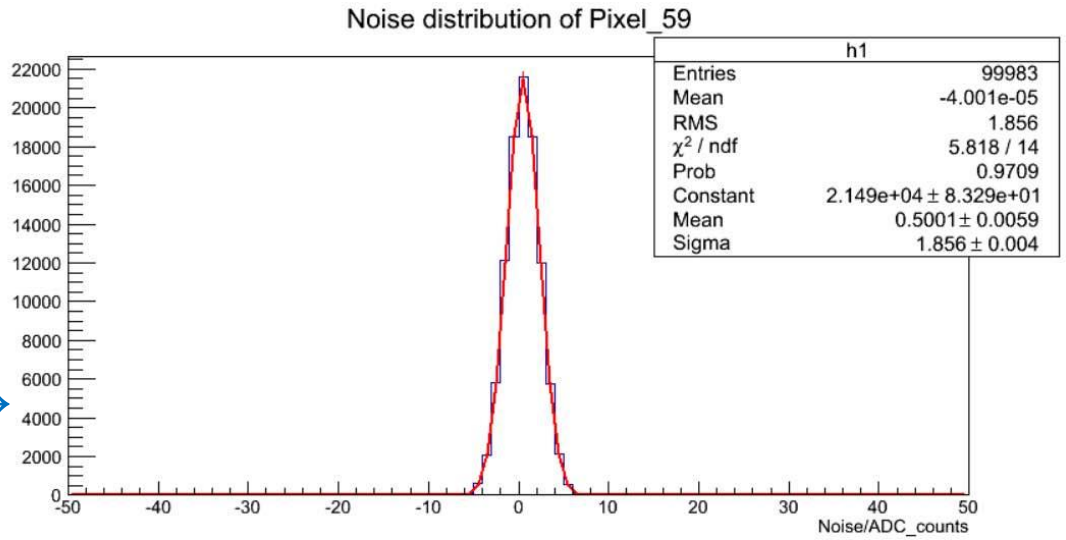
- The MPW electronics is based on the test electronics for SUPIX in SDU, which is under testing now
- Currently, the SUPIX electronics perform well

Status of the readout electronics

Preliminary results

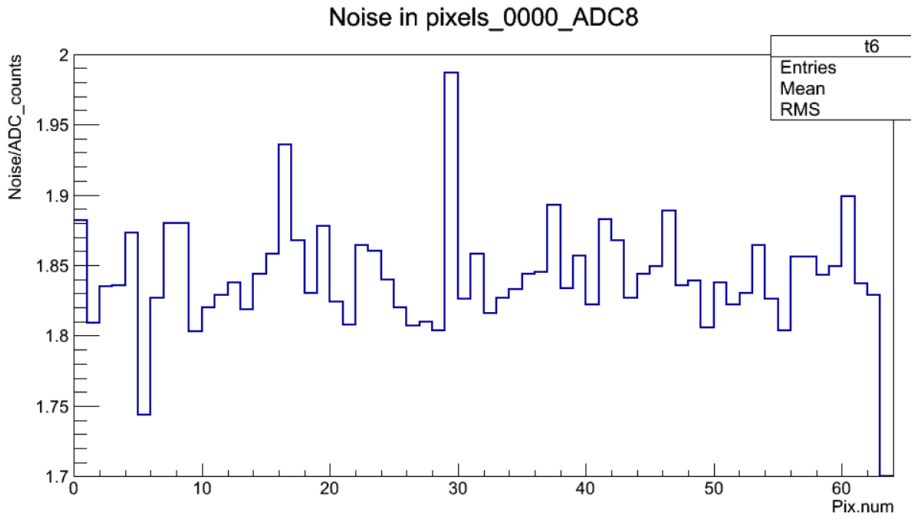
Noise distribution for a typical pixel →

Sigma ~ 1.86



Noise distribution of 64 pixels →

Sigma < 2



Schedule of the readout board

- **The readout board will start as soon as the chip design report or layout design is finished**
  - Schematic & PCB design of main board ~ 40 days
  - PCB processing ~ 20 days
  - Component solder ~ 15 days
  - Wire-bonding ~ 7 days
  - FPGA code and DAQ testing ~ 30 days

Summary & outlook

- **The MPW electronics are composed of main board and FPGA board, which are based on the current design of test electronics for SUPIX in SDU**
- **The test electronics and preliminary DAQ for SUPIX perform well currently**
- **The MPW electronics design is scheduled to start as soon as the sensor layout is done**
  - The PCB and FPGA design will based on the current design for SUPIX
  - The DAQ design may be improved if anyone is interested in it

Thanks for your attention