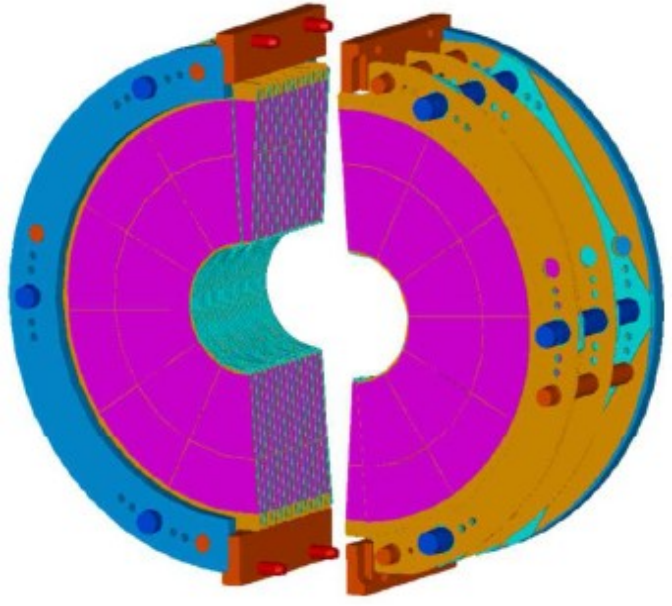
FCAL testbeam preparation

Szymon Kulis* on behalf of **FCAL** Collaboration

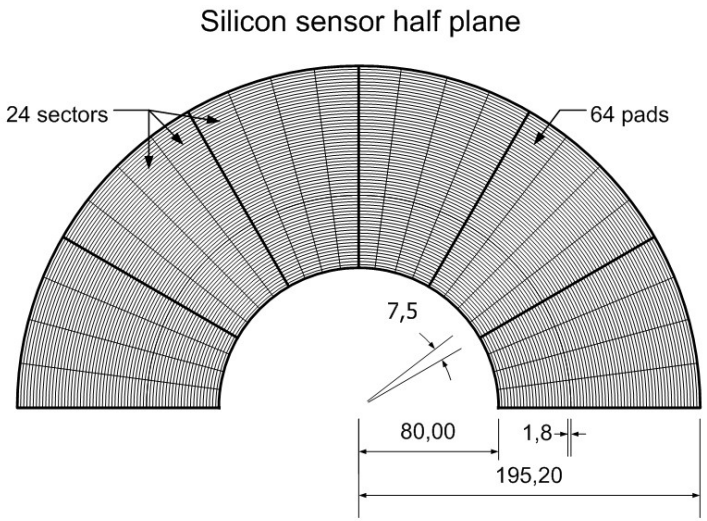
***)** AGH-UST Kraków

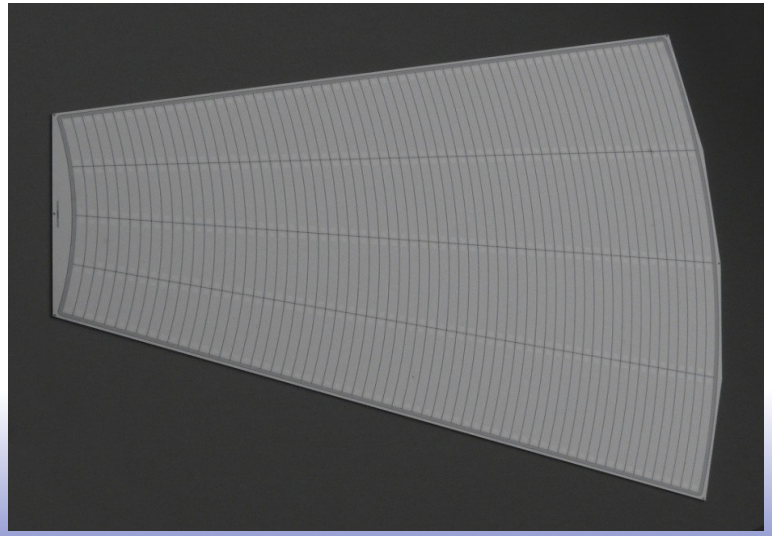
Outline

- Development status
- Preparation of test setup of the whole readout chain
- Testbeam plans
- Summary & plans



Silicon sensors





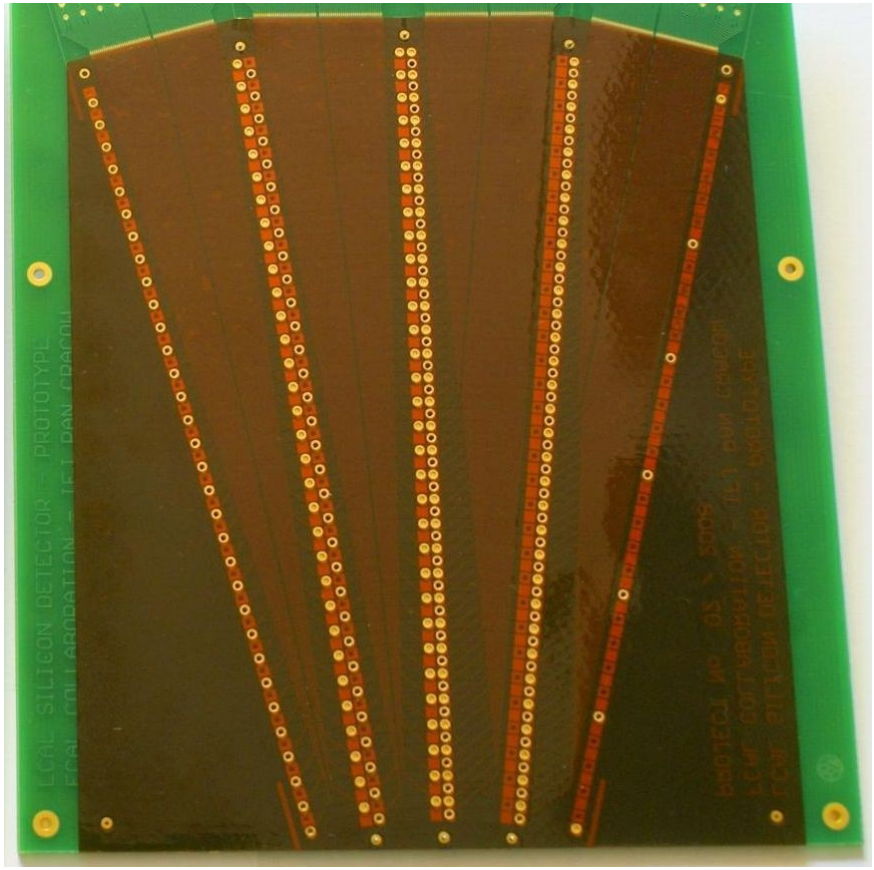
- 48 azimuthal sectors
- 64 radial pads in sector
- Prototypes (30° ↔ 4 sectors each) from Hamamatsu
- High resistivity n-type Si bulk 320um thick
- P+ pads with Al-metalizaion (DC coupled)

Prototypes produced

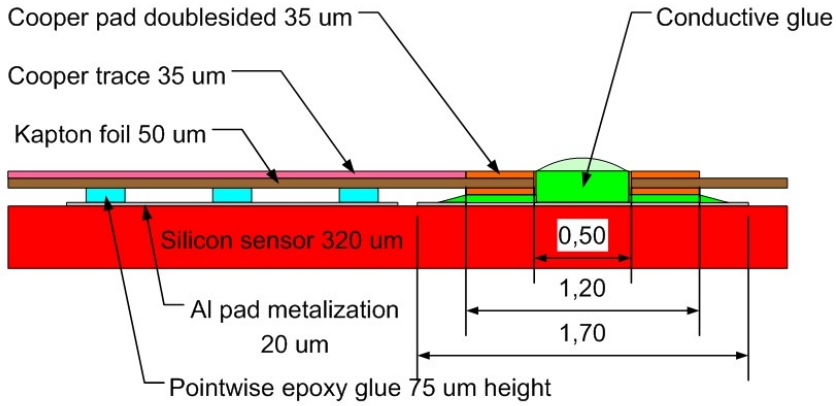
Electrical parameters checked

Tests with particles needed

Capton fanout

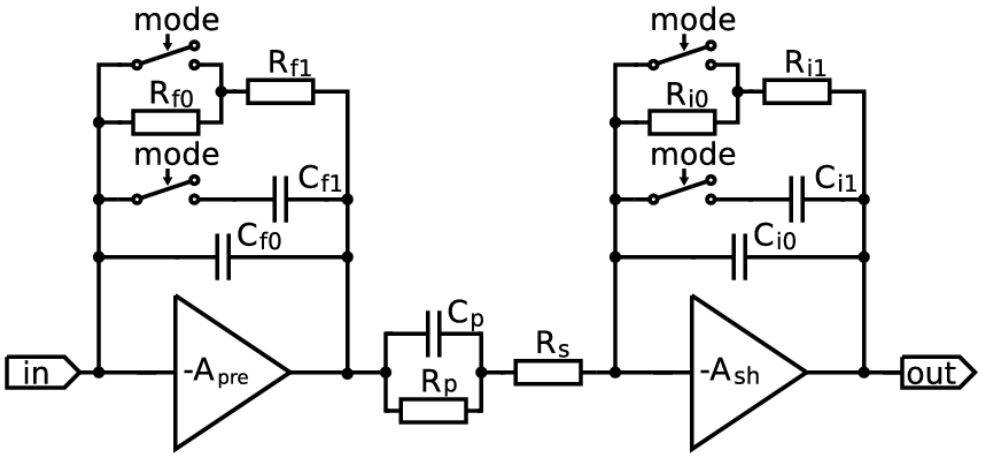


- 50um thick
- Two slightly different types of fanout produced
- Will be glued to sensors

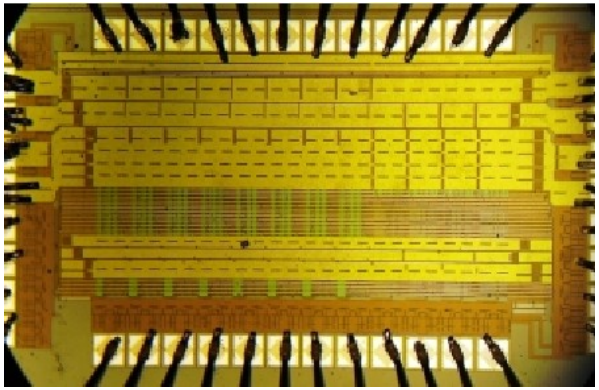


First prototypes produced

Front-end electronics



- Charge amplifier
- Pole zero cancellation
- 1st order shaping
- Fabricated in AMS 0.35µm



Specifications:

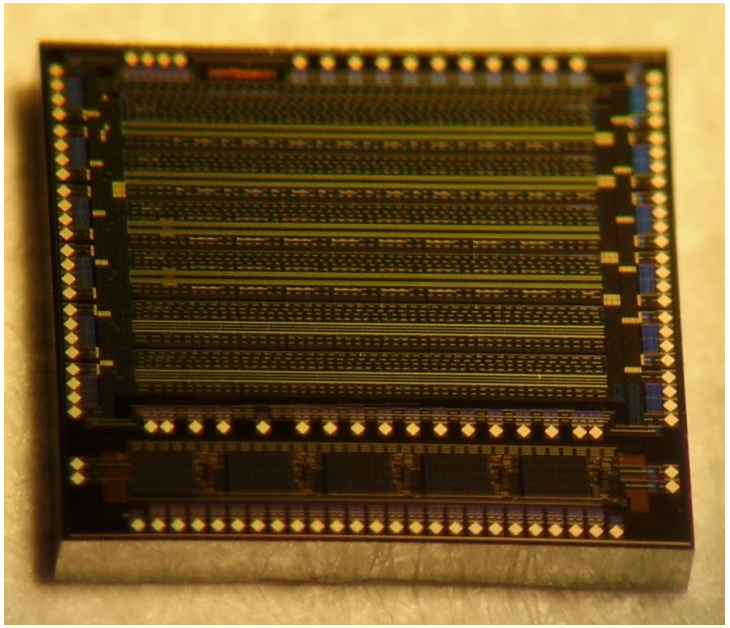
- C_{det} = 10 – 100 pF
- T_{peak} ~ 60 ns
- Variable gain:
  physics and calibration mode
- Q_{max} ~ 10 pC
- Calibration mode: S/N > 10 for MIP

8 channels prototype produced

measurements agree with simulations

Tests with sensor needed

10 bit pipeline ADC



- Pipeline architecture (fully differential) power efficient & small area
- 10 bits resolution (1.5 bit per stage)
- Input dynamic range 2 V
- Maximum sampling rate ~30 MHz
- DNL < 0.5 LSB, INL < 1 LSB
- Multi channel version should be ready in few months (beginning of 2010)

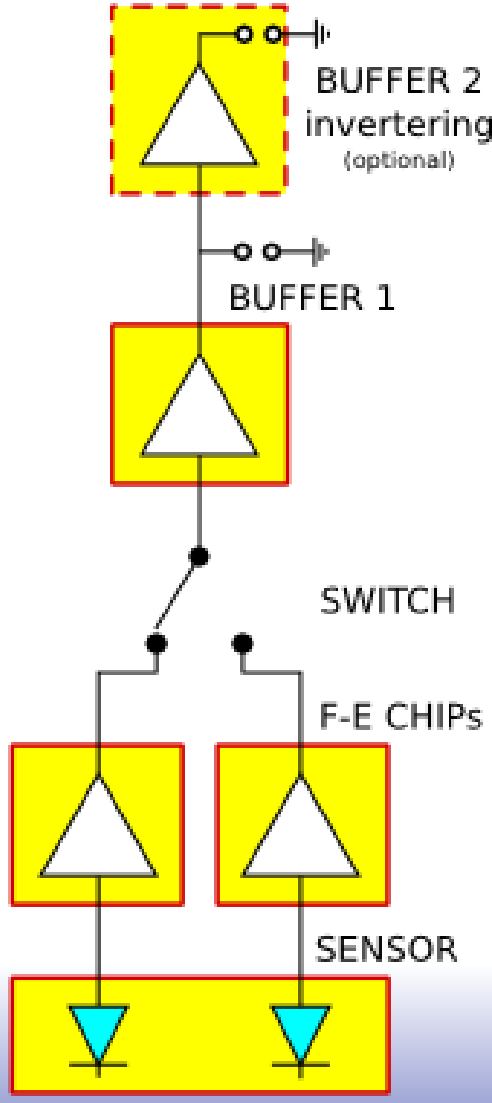
Prototype ADC channels with and without S/H fabricated in AMS 0.35 μm technology

single channel prototypes produced

measurements agree with simulations

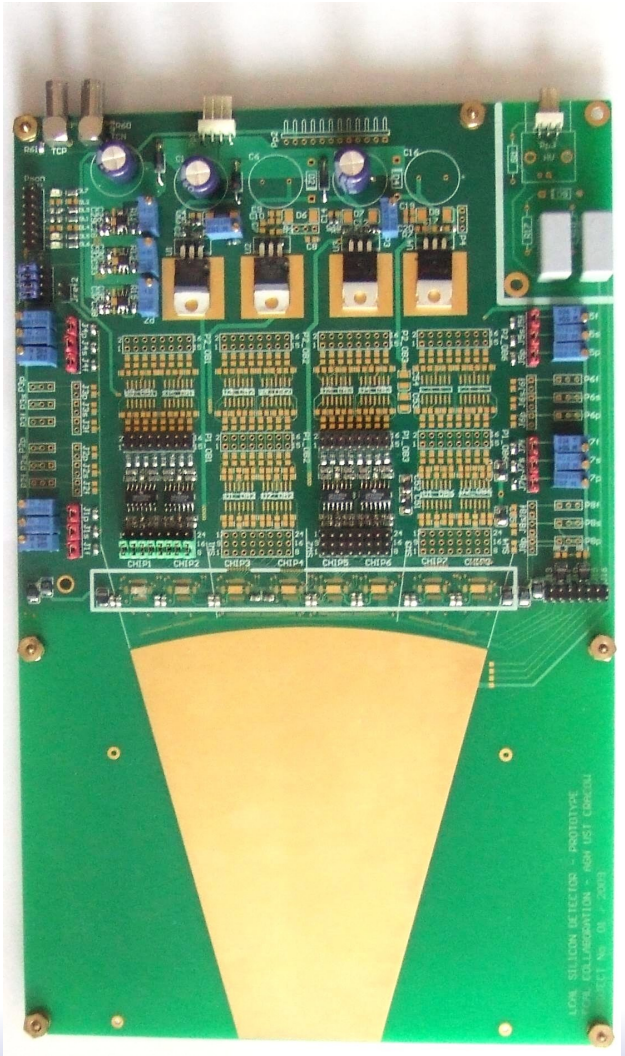
More measurements needed

Preparation of sensor-readout electronics test-setup chain



- Setup includes:
  - Sensor
  - Capton fanout
  - Dedicated PCB
  - Front-end ASICs
  - Output buffers
    (to drive long wires)
- No ADC on board
  (NO multichannel ADC yet)

Readout chain test setup



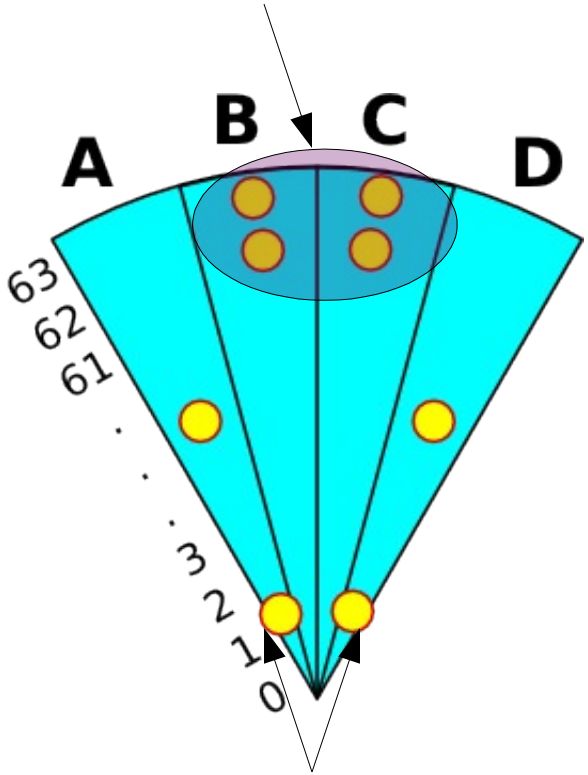
- Up to 8 front-end ASIC (64 channels)
- Two types of fanout can be tested
- All needed biasing and power supply included
- Buffered analogue outputs

PCB produced and partially assembled

Assembly needs to be completed...
Readout chain needs to be tested...

Preparation of testbeam

testbeam area ?

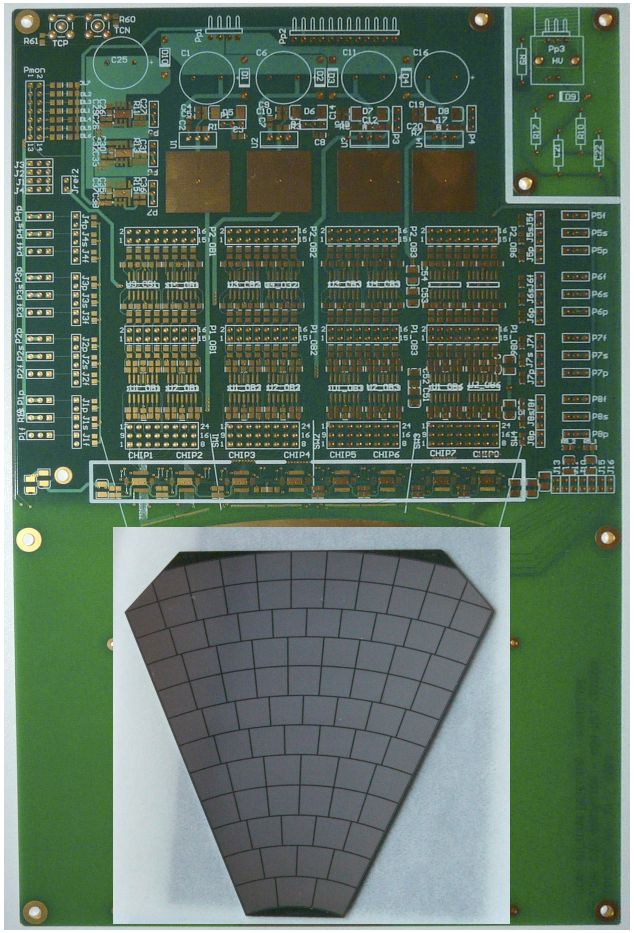


Each yellow dot means :
1 ASIC (8 channels)

- Same setup is going to be used for testbeam – PCB board designed to be used also in testbeam
- Up to 32 readout channels can be read at the same time
- External multichannel ADC has to be used
  - VME – V1740 will be used
  - Work on software has started
- External trigger (Eudet telescope ?)

The whole readout chain needs to be checked first…

Preparation of testbeam...



- We would like to use EUDET telescope for tracking
- We would like to check the chain also with BeamCal GaAs sensors

Status & Plans

- Sensors — READY
- Capton fanout — READY
- 8 channel front-end ASIC — READY
- Single channel ADC ASIC — READY
- Dedicated PCB — READY
- Parametrization of setup — IN ROGRESS — ~ Jan.2010
- Multichannel ADC ASIC — IN ROGRESS — ~ Dec.2009(submission)

- **Test beam planed in the middle of 2010**