

The readout discussion for luminosity measurement at the CEPC

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Detector: Si-W (SiPIN—tungsten)

- collision period: 25ns
- Dynamic range: 200MIP, 50MIP (4.32MeV, 0.192pC) at least
- Noise: $S/N > 7$, ENC=171ke,
- Lowest limit: 24ke (mip at 300um Si)

ATLAS Luminosity Monitoring

ATLAS 25ns interval time;

Readout by photo-multiplier;

The fast time response (few ns) and the short pulses ($< 10\text{--}15$ ns) allow to distinguish signals from adjacent bunch crossings (separated by 25 ns)

Photo-multiplier have gain itself, the preamplifier is very simple, even a resistor. So it can operate very fast.

Preamplifier for SiPIN is complex and much slower. It is hard to handle one or more event in 25ns.

Shaper and restore time is more than 1.5us

A SKIROC2-based prototype electronics system for silicon PIN array

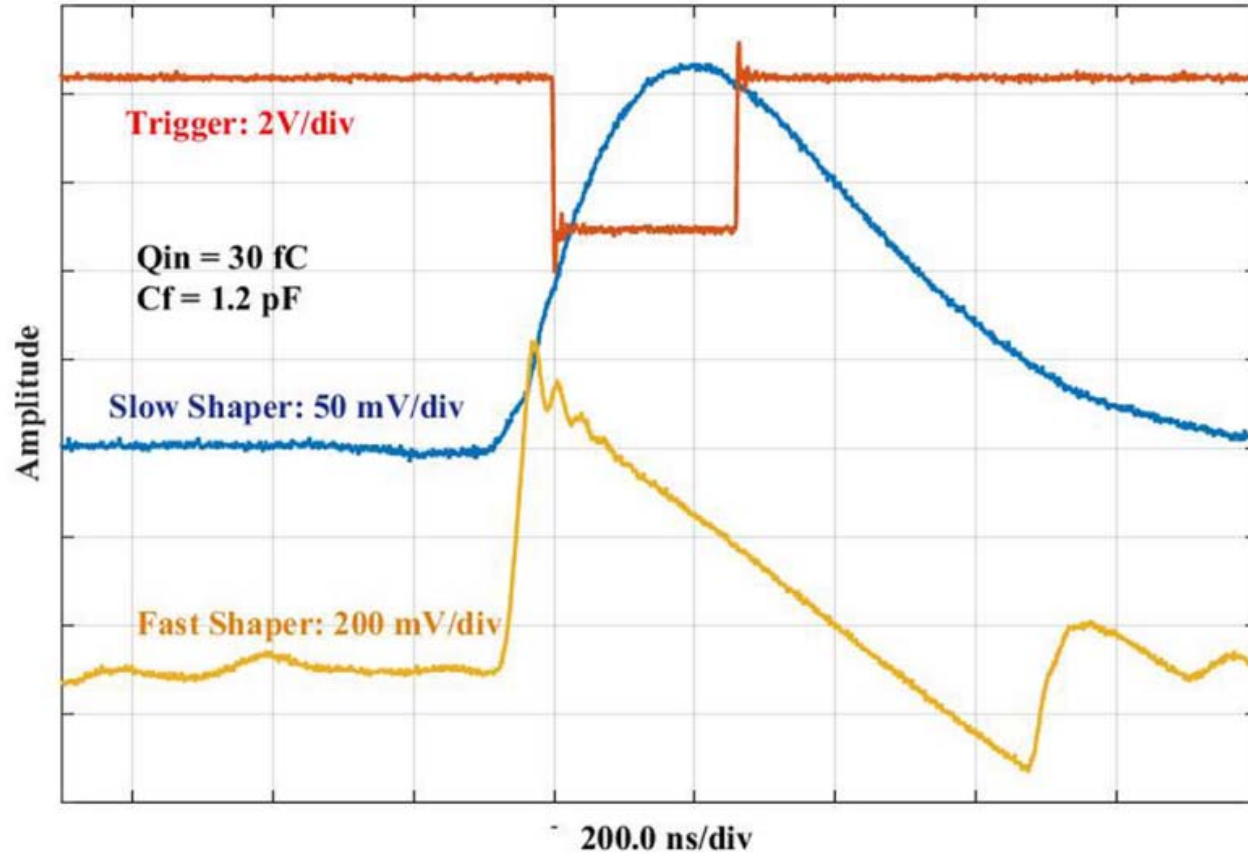
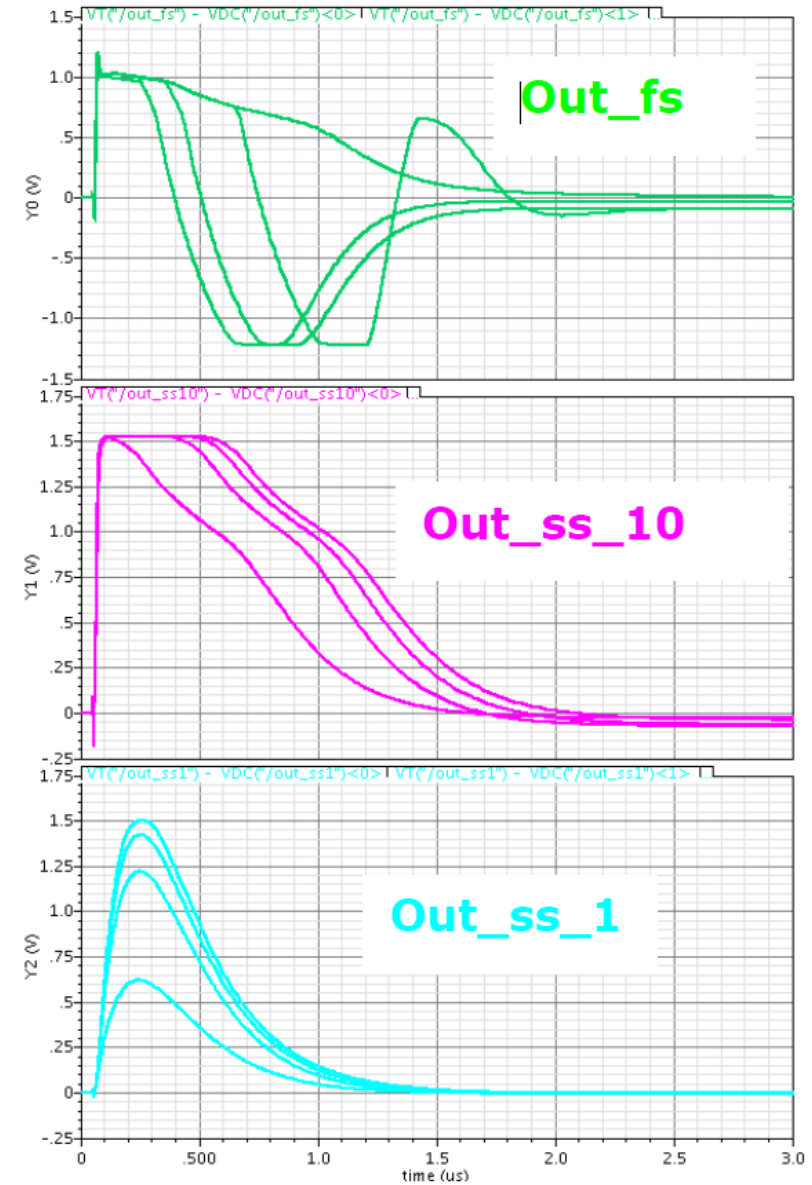
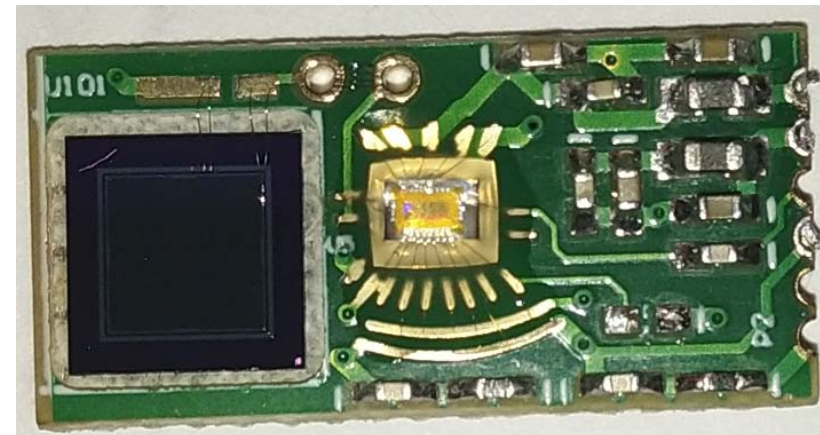
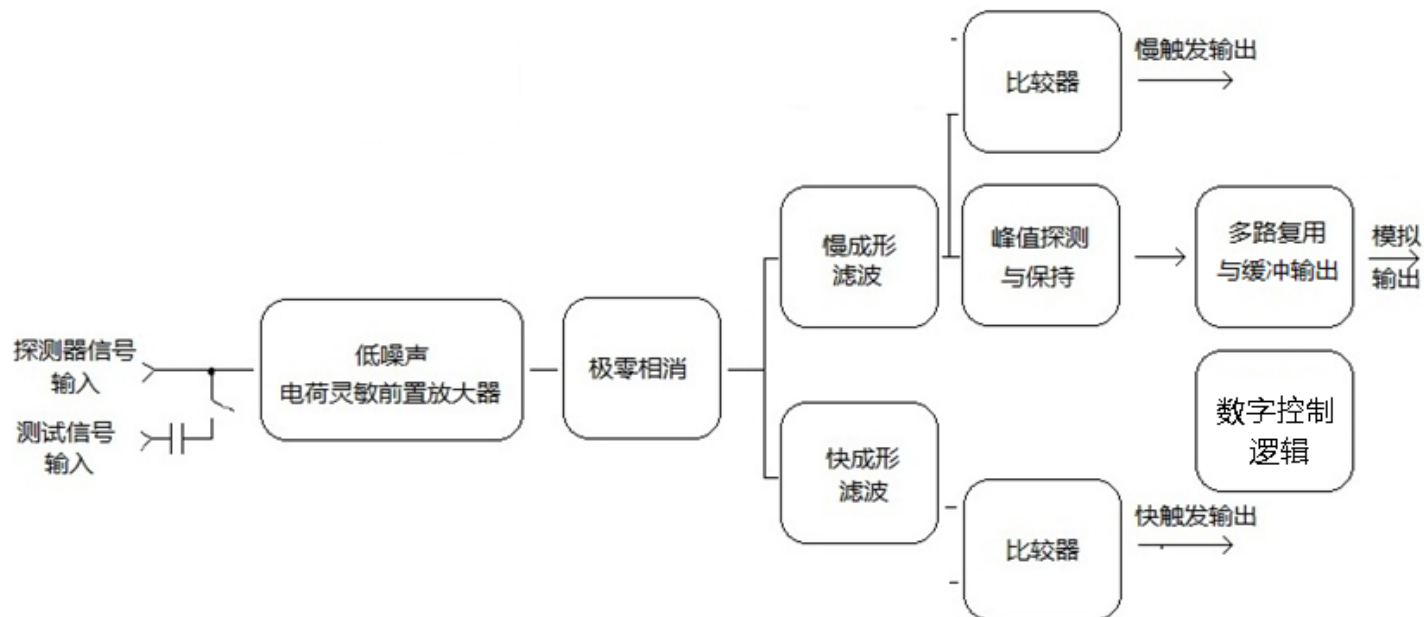


Fig. 7 The typical outputs of the fast shaper, slow shaper and trigger from single channel of SKIROC2



Fastshaper (fs) , slow shaper (ss10, SS1)
Waveform of skiroc2
skiroc2_datasheet_public

Our group are devellopping a 40ch ASIC for SiPIN



Preamplifier for SiPIN

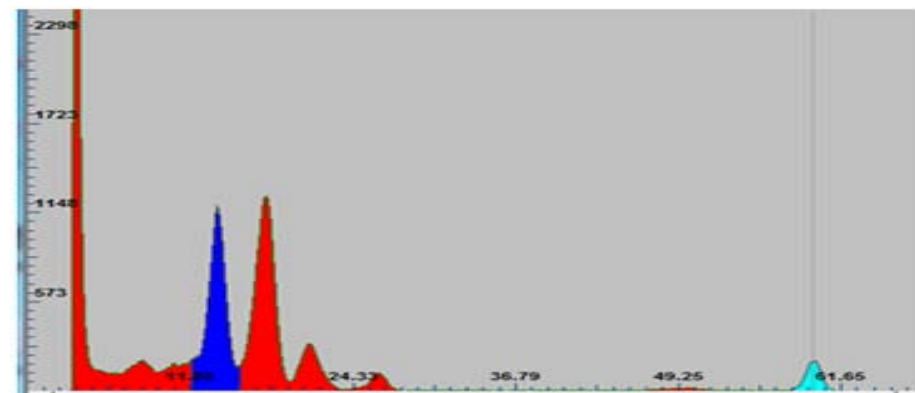
Noise: 100e (ENC)

Event rate: 200k per chip

Minimum peak time: 0.3 us

Channel: 1-40

Power: fast shut down and power up (for power pulsing)



Spectrum for Am241,
半高宽FWHM=1.4keV @59.5keV

The readout scheme is decided by the event rate of single detector with tens of channels.

If the rate is lower than about 100k, a conventional Si readout ASIC can be used.

If the rate is higher than 100K, a integrated preamplifier might be chosen which is readout by a fixed interval. But single event energy can not be given out.