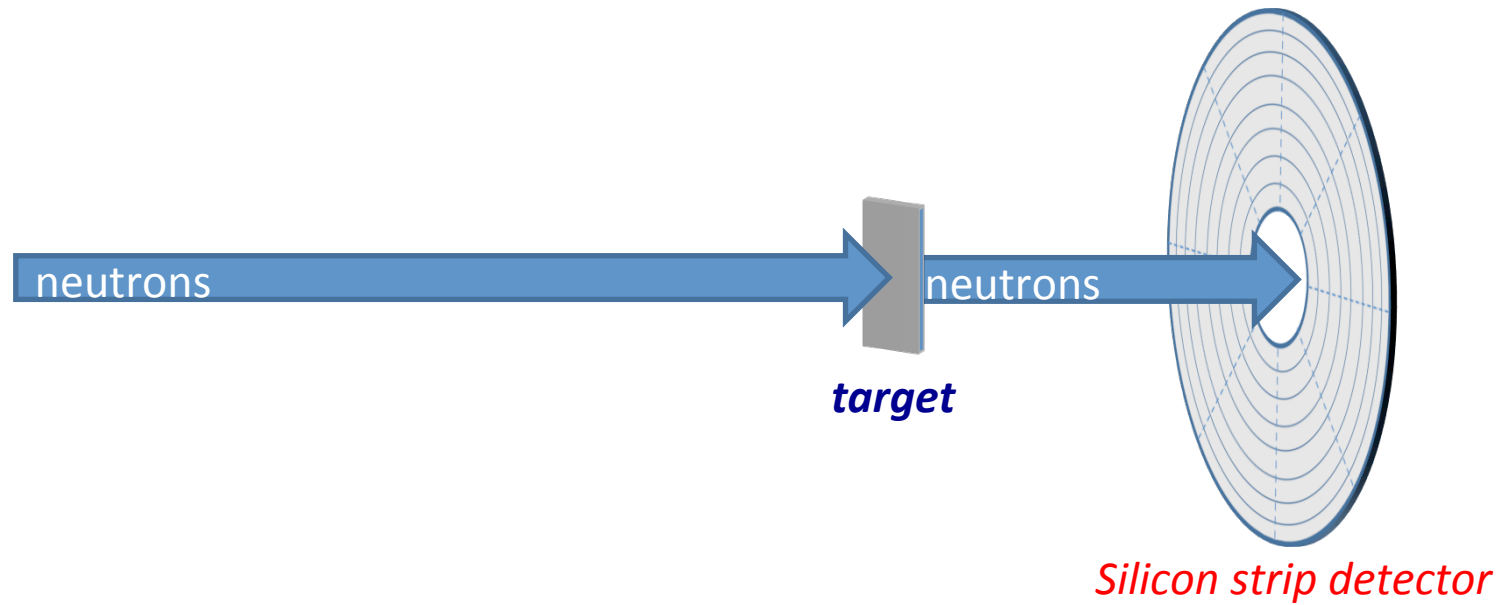
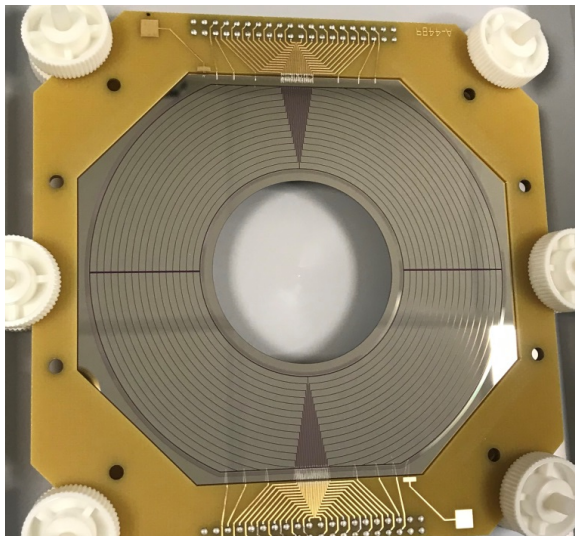
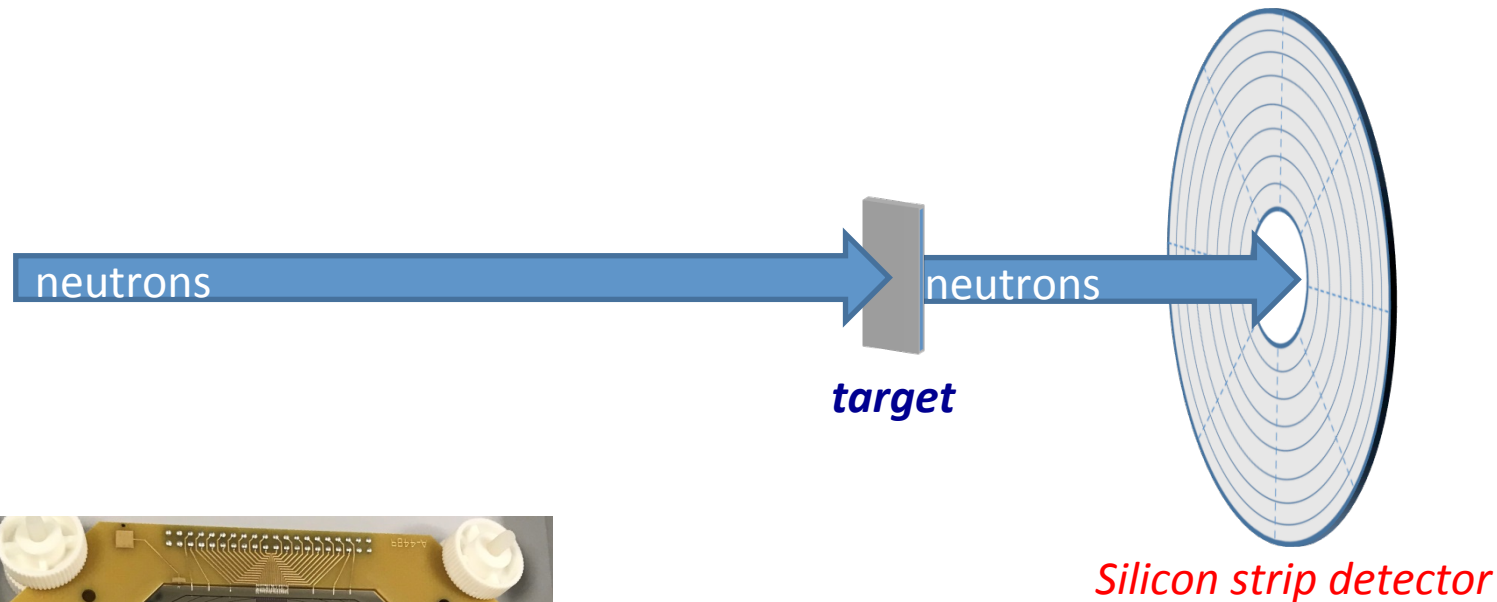


New detectors for (n,cp) measurements.



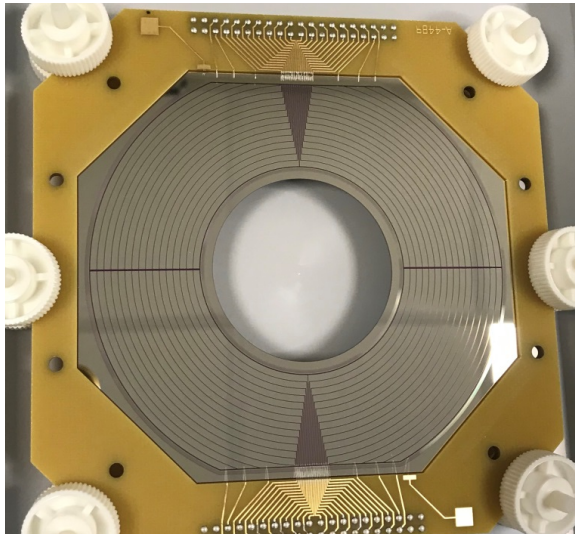
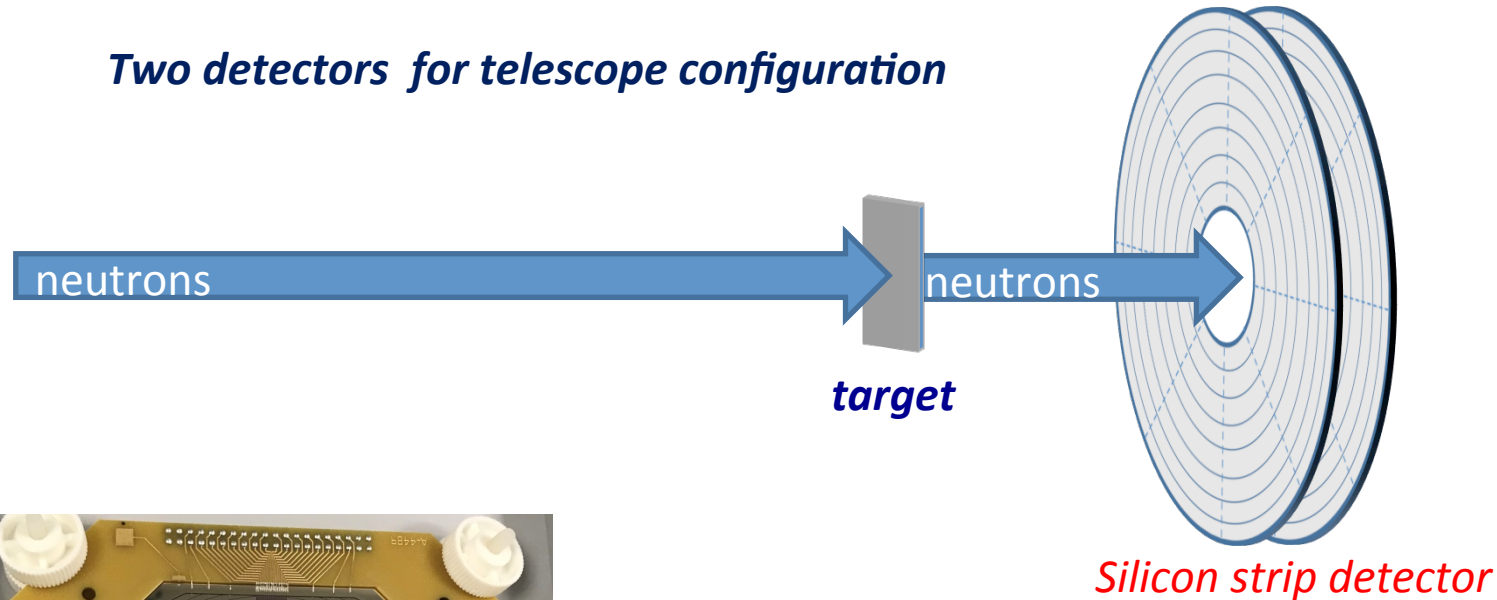


Micron Semiconductor

- Thickness: 300 μm
- Outer Diameter: 96 mm
- Central Hole: 46 mm
- No of Rings (Junction): 16
- No of Elements (Junction): 64
- No of Sectors (Ohmic): 16

Particle Discrimination

Two detectors for telescope configuration

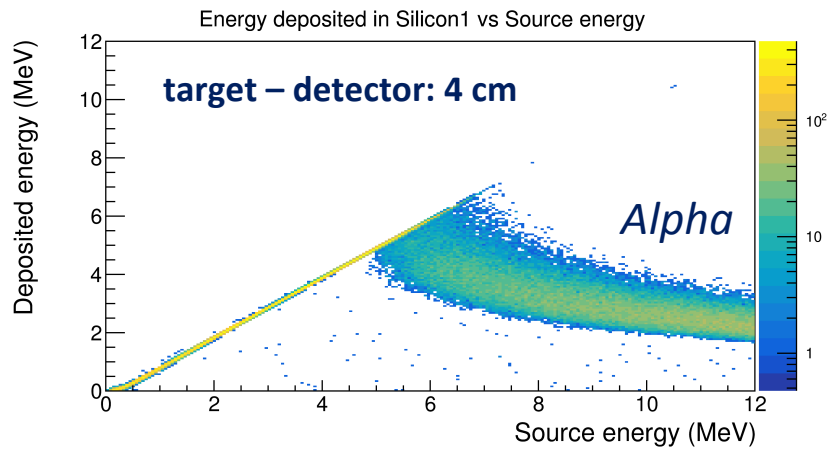
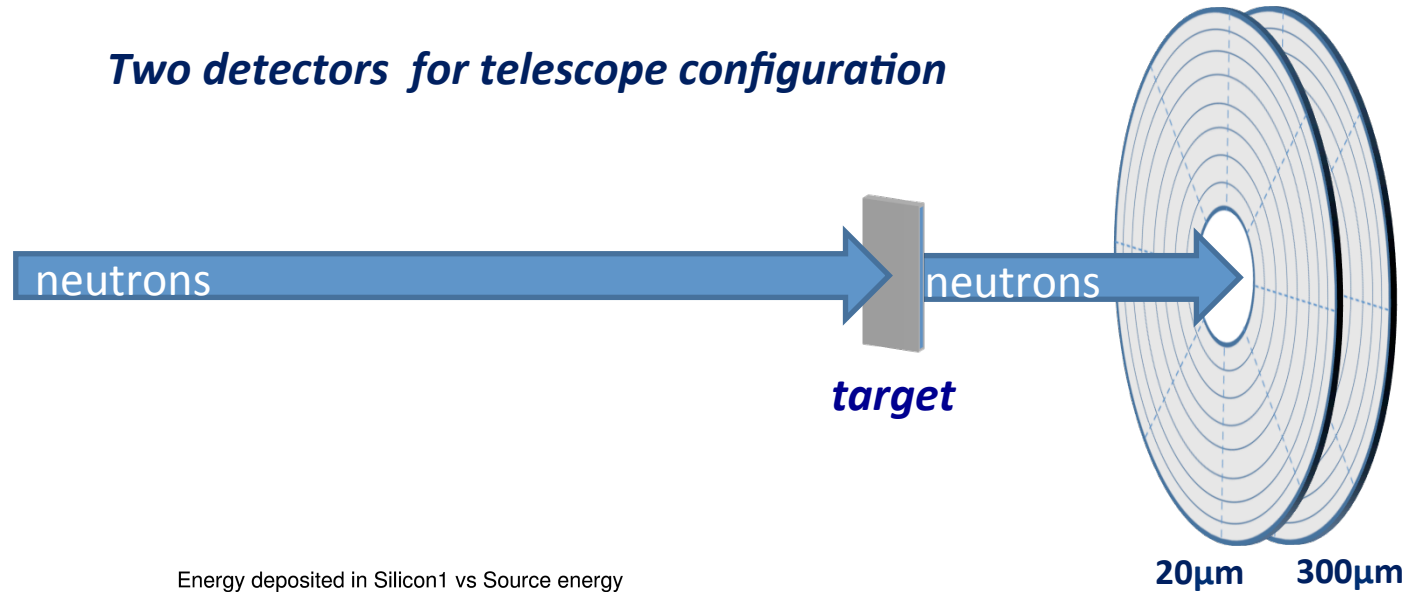


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Particle Discrimination

Two detectors for telescope configuration

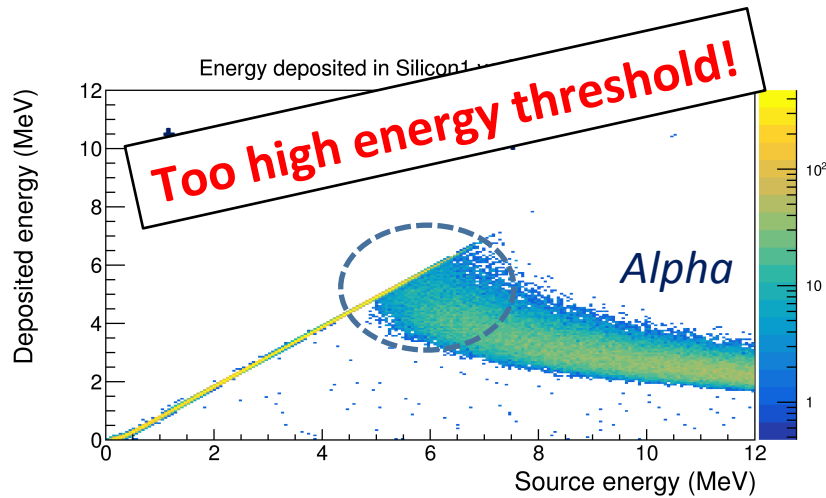
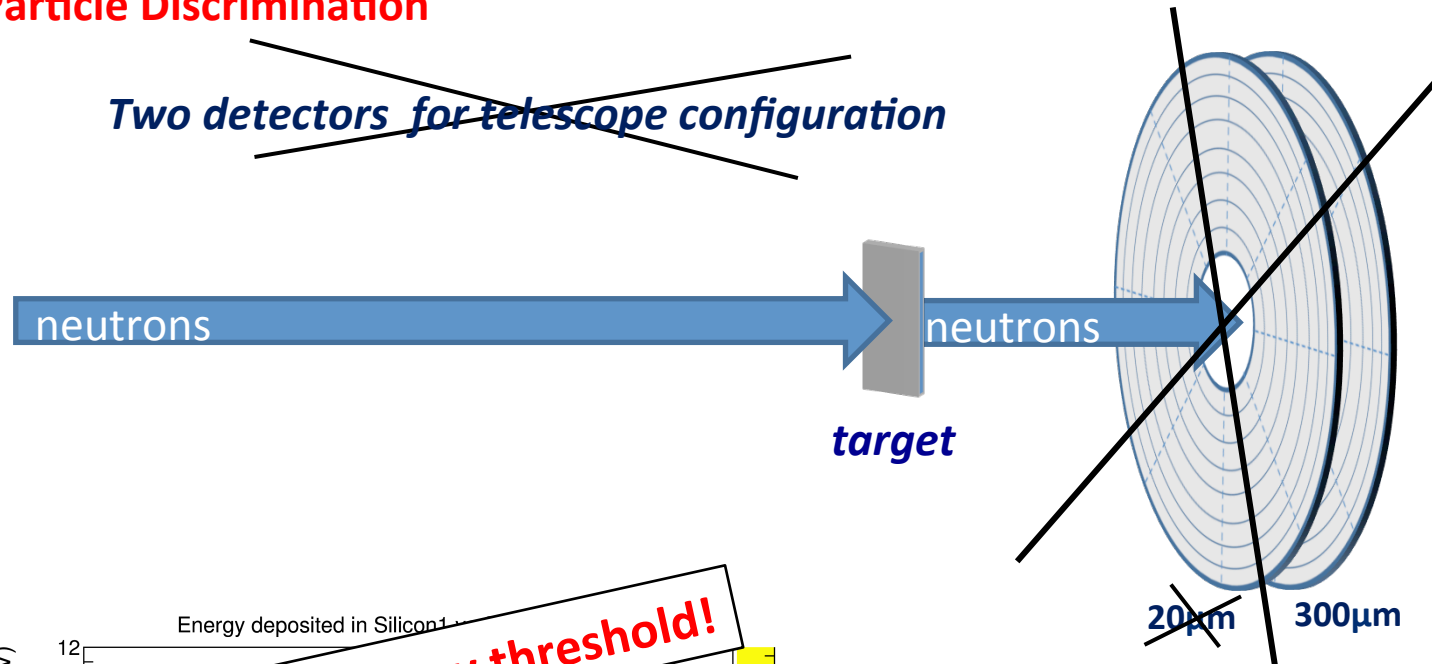


1st detector	Telescope
11%	6 %

Alpha efficiency (< 12MeV)

Particle Discrimination

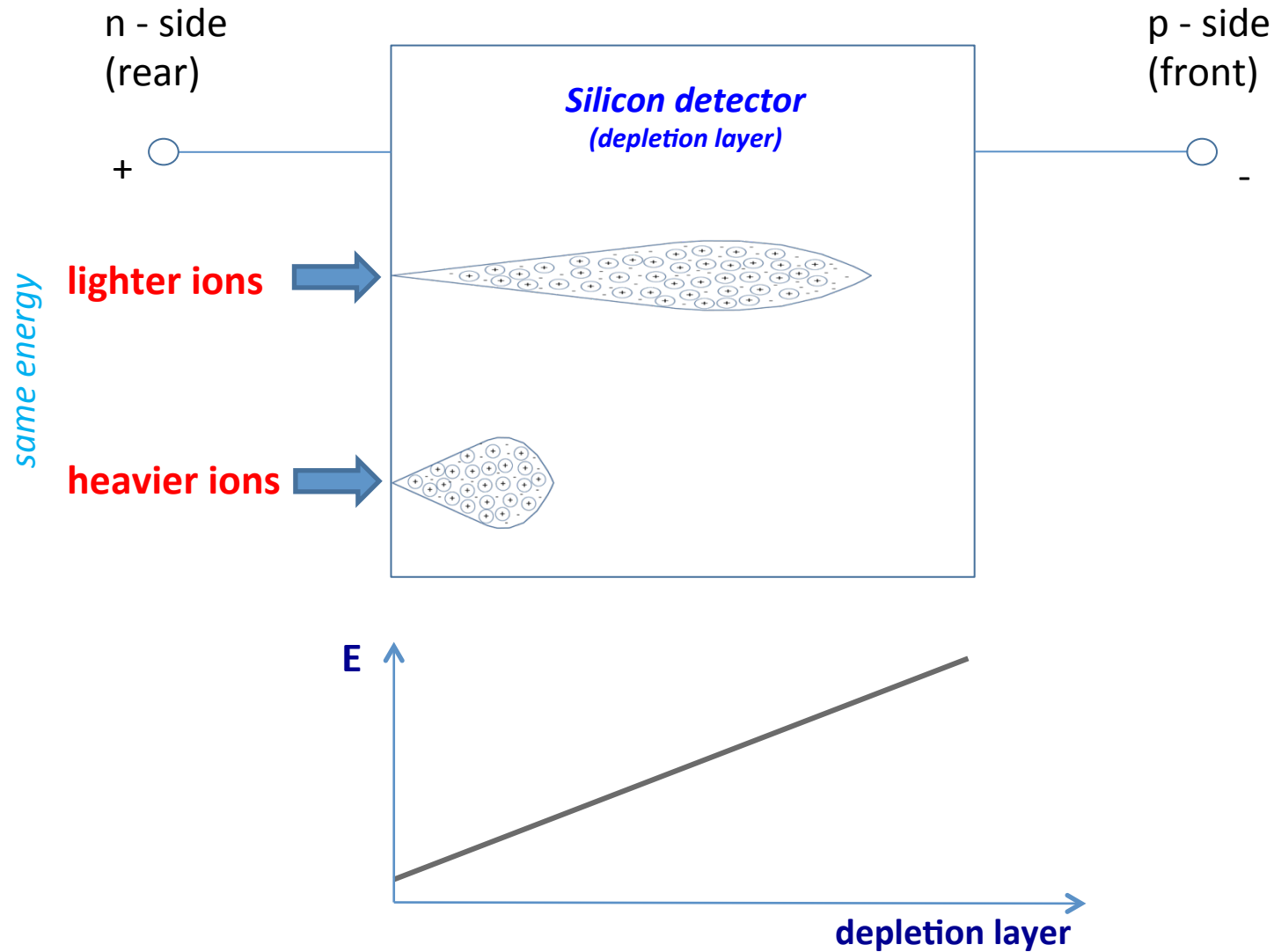
~~Two detectors for telescope configuration~~



1st detector	Telescope
11%	6%

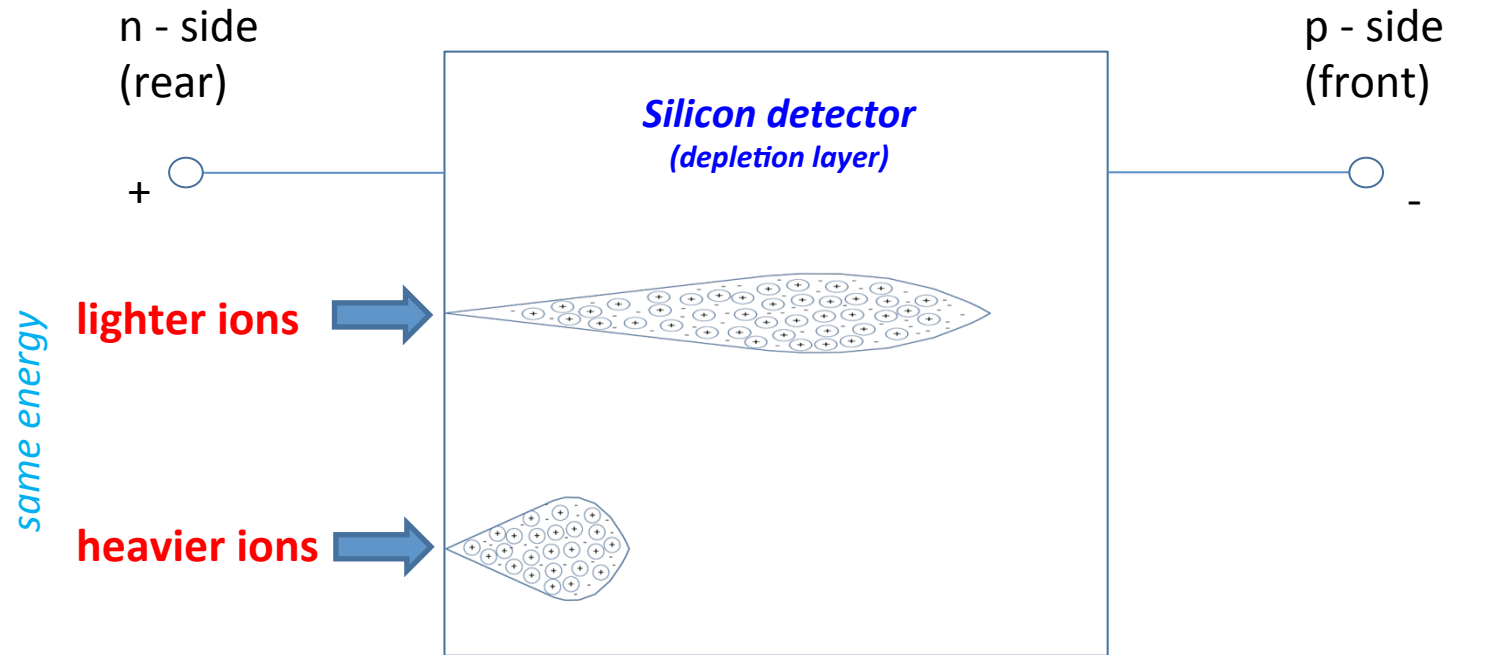
Alpha efficiency (< 12MeV)

Particle discrimination by rear side injection mode

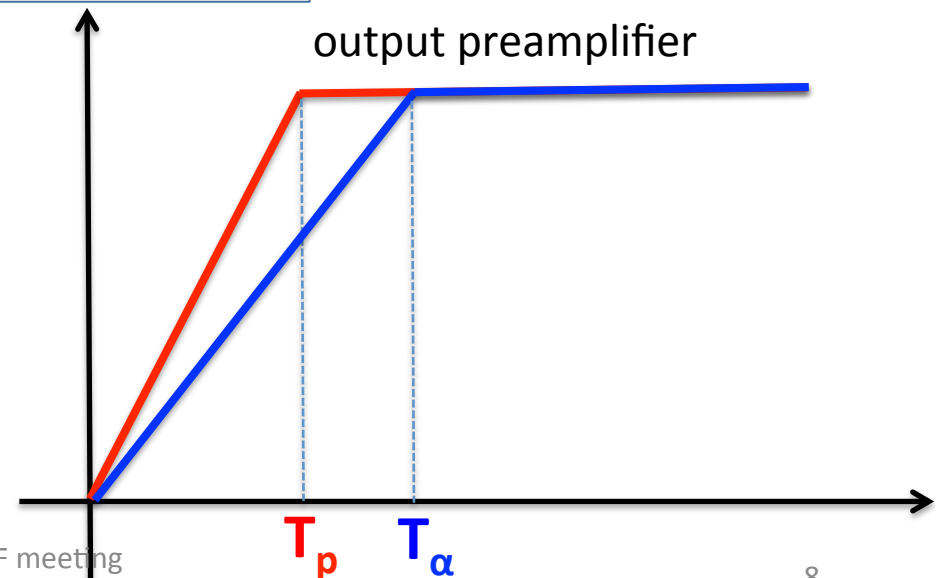


The charge collection time **affects** the shape of the signal

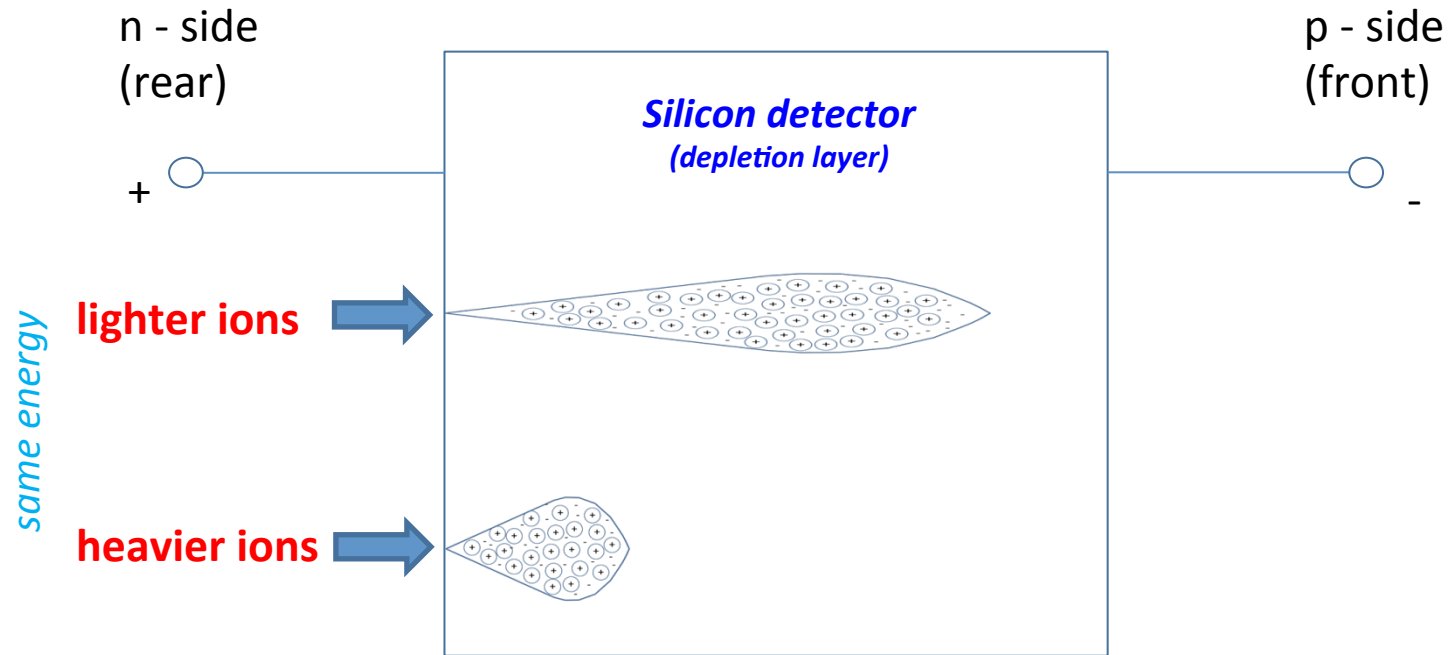
Particle discrimination by rear side injection mode



The charge collection time depends on E, Z, A .



Particle discrimination by rear side injection mode



If

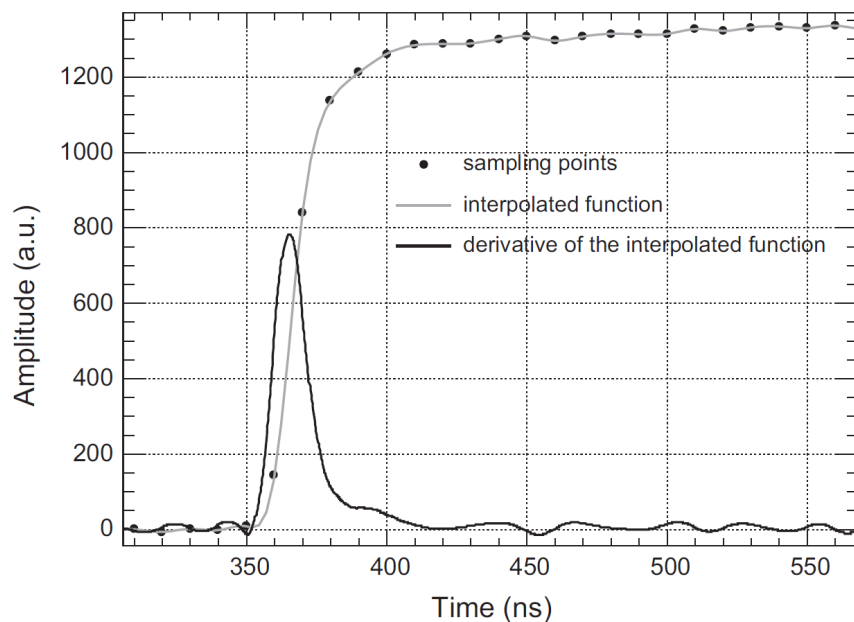
- ✓ Injection in the rear (ohmic) side
- ✓ High E field gradient (low overvoltage)
- ✓ High E uniformity → neutron-transmutation-doped silicon (NTD)

Pulse Shape



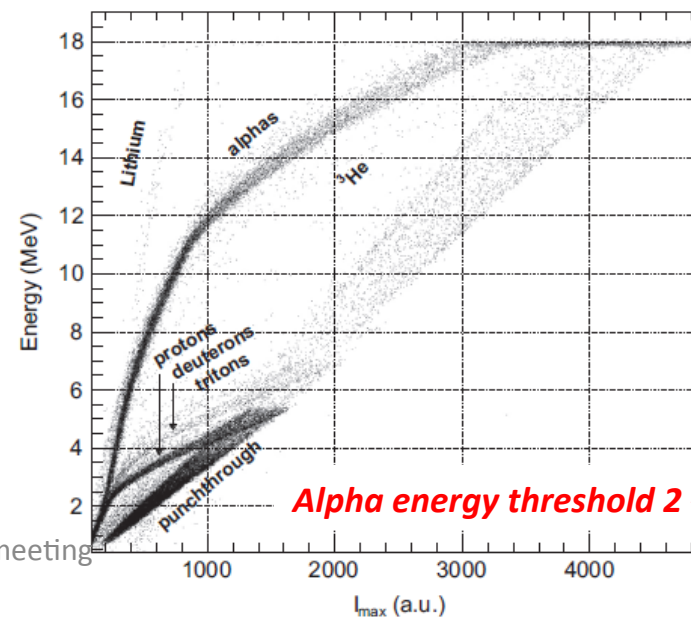
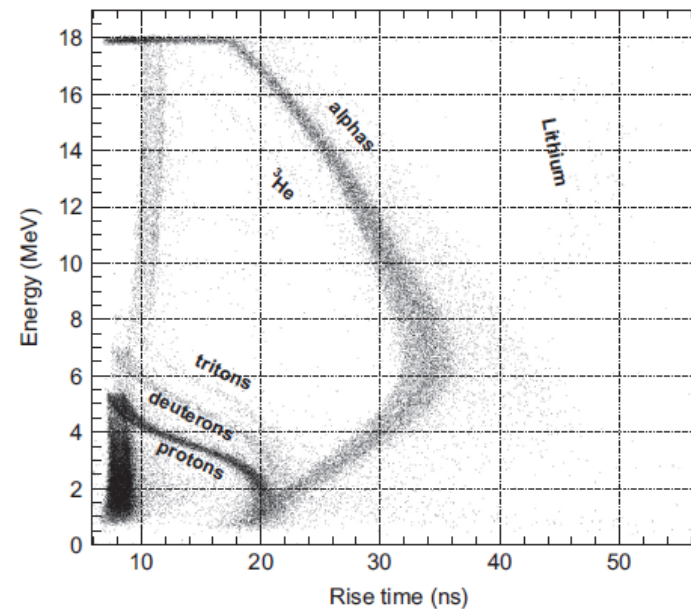
(A,Z)

D. Mengoni et al, NIM A764 (2014) 241–246

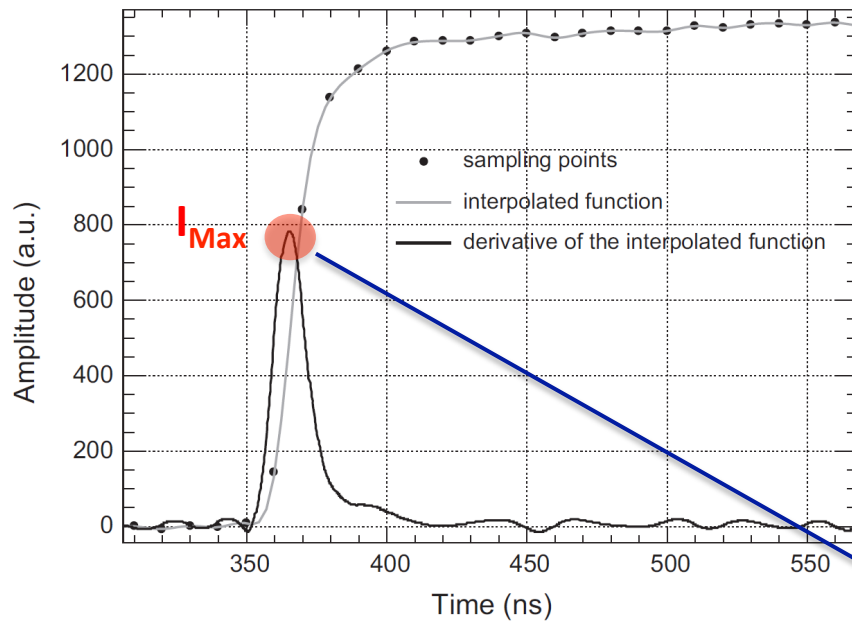


Current signal by:

- *fast current amplifier*
- *derivative of the charge signal*

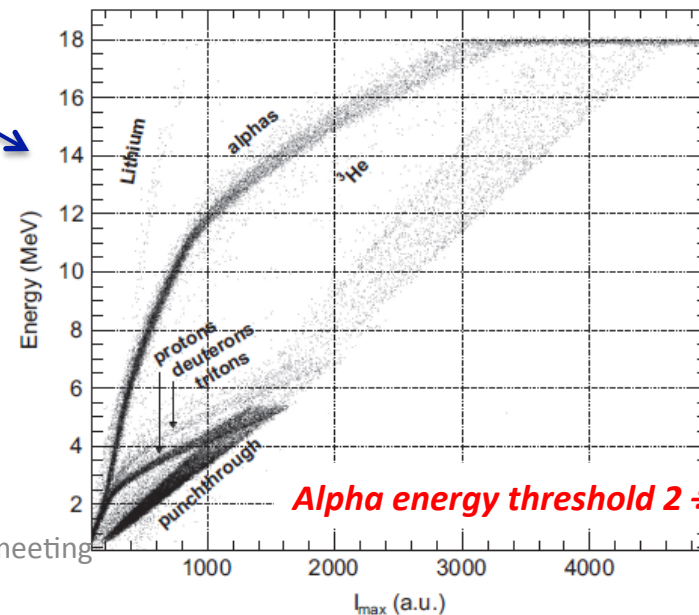
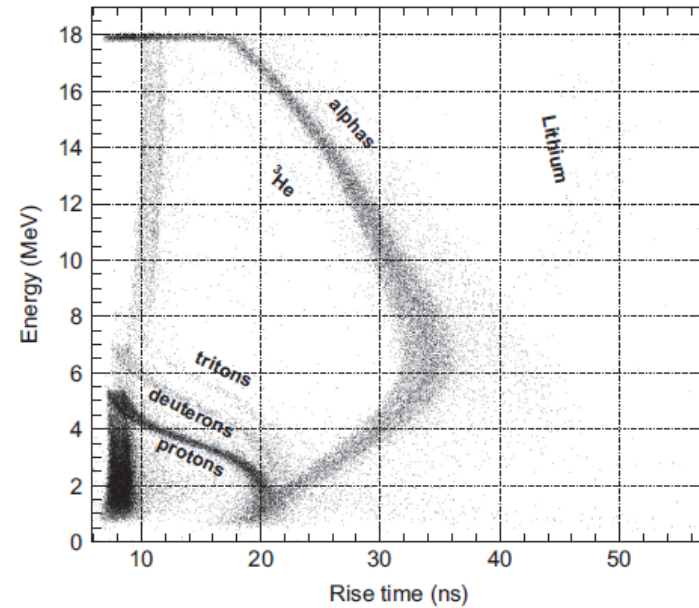


D. Mengoni et al, NIM A764 (2014) 241–246

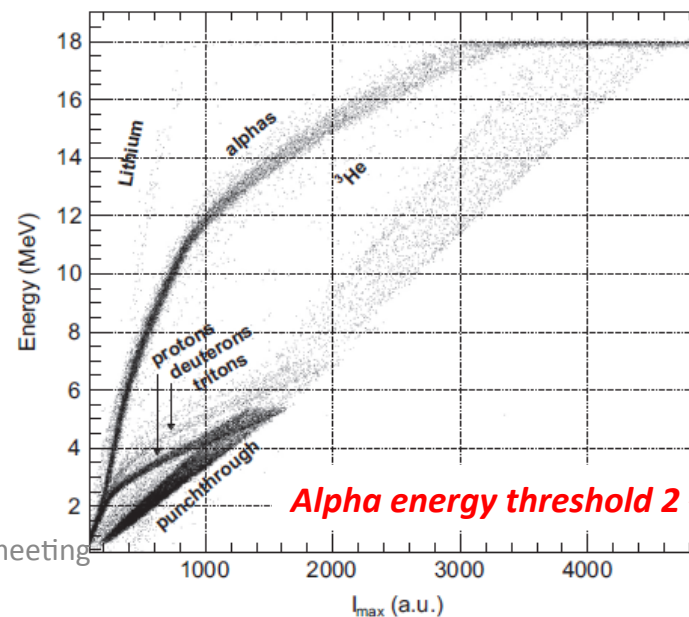
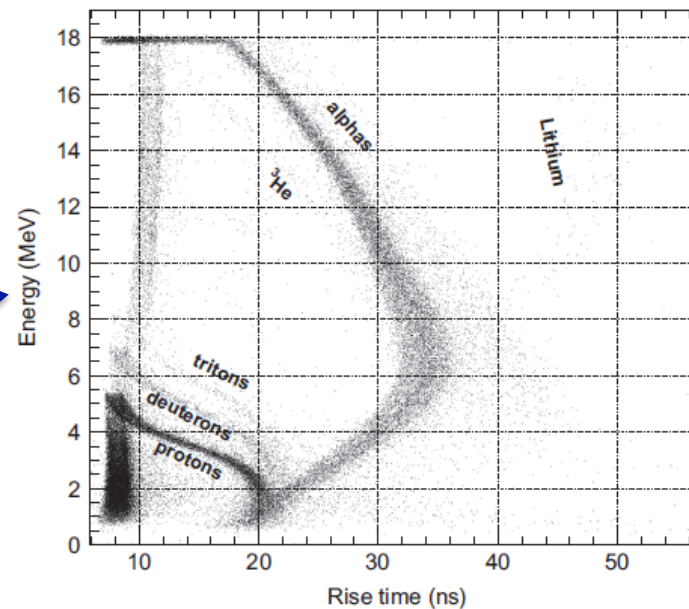
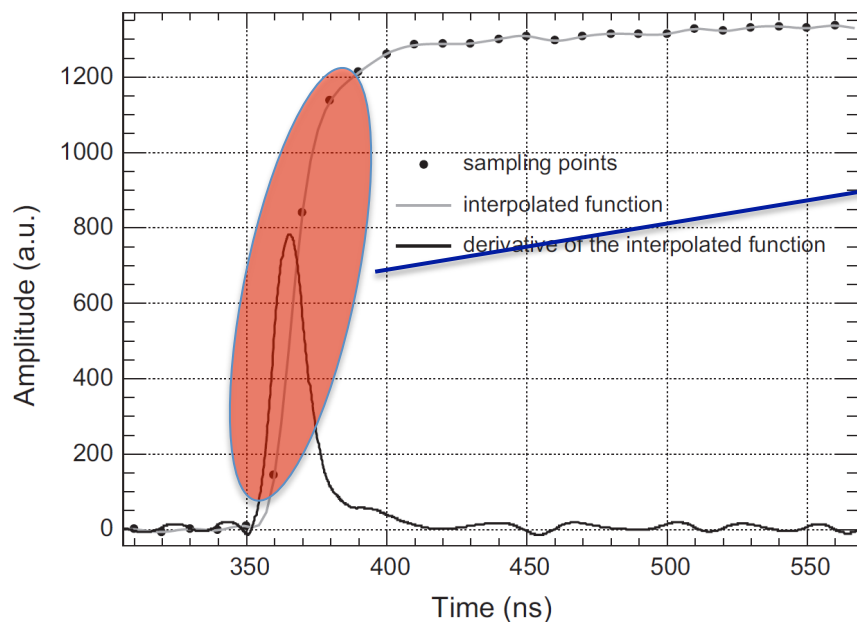


Current signal by:

- *fast current amplifier*
- *derivative of the charge signal*

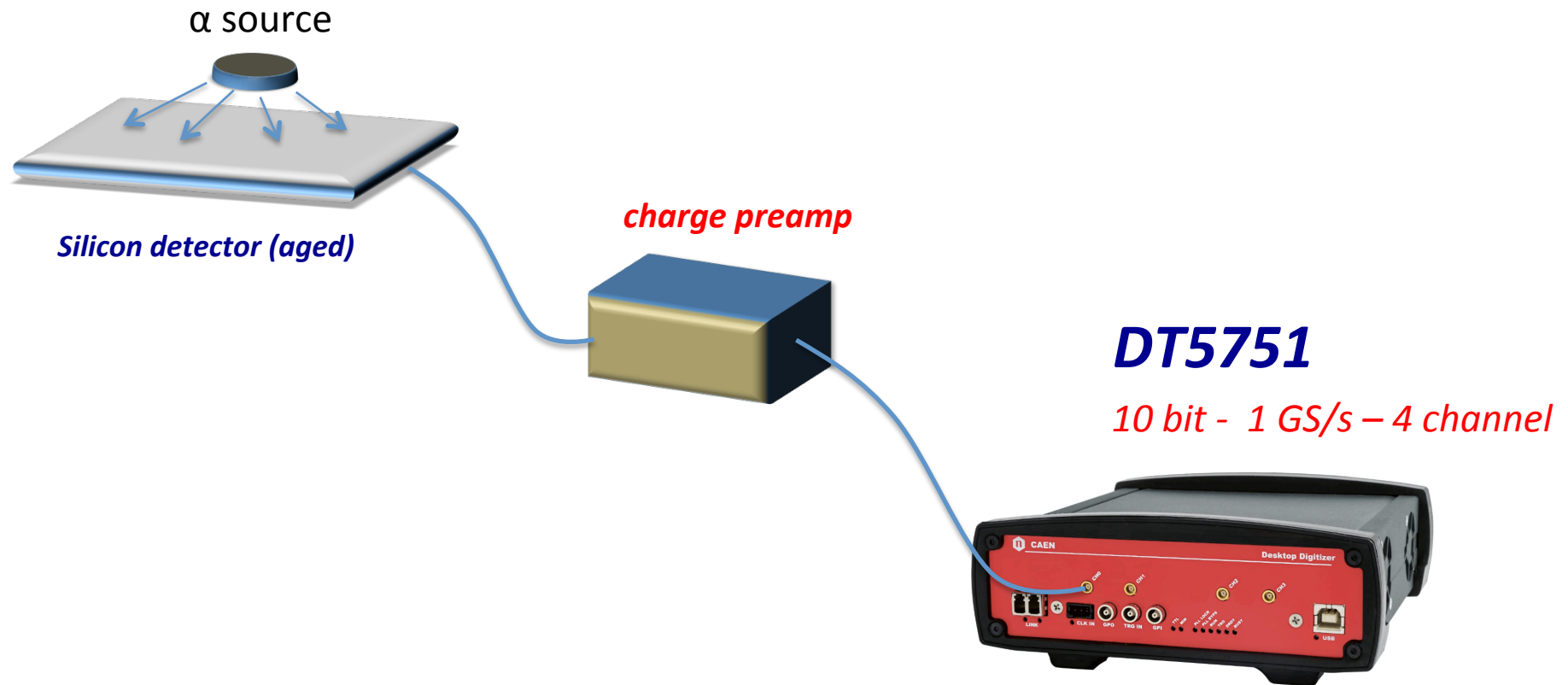


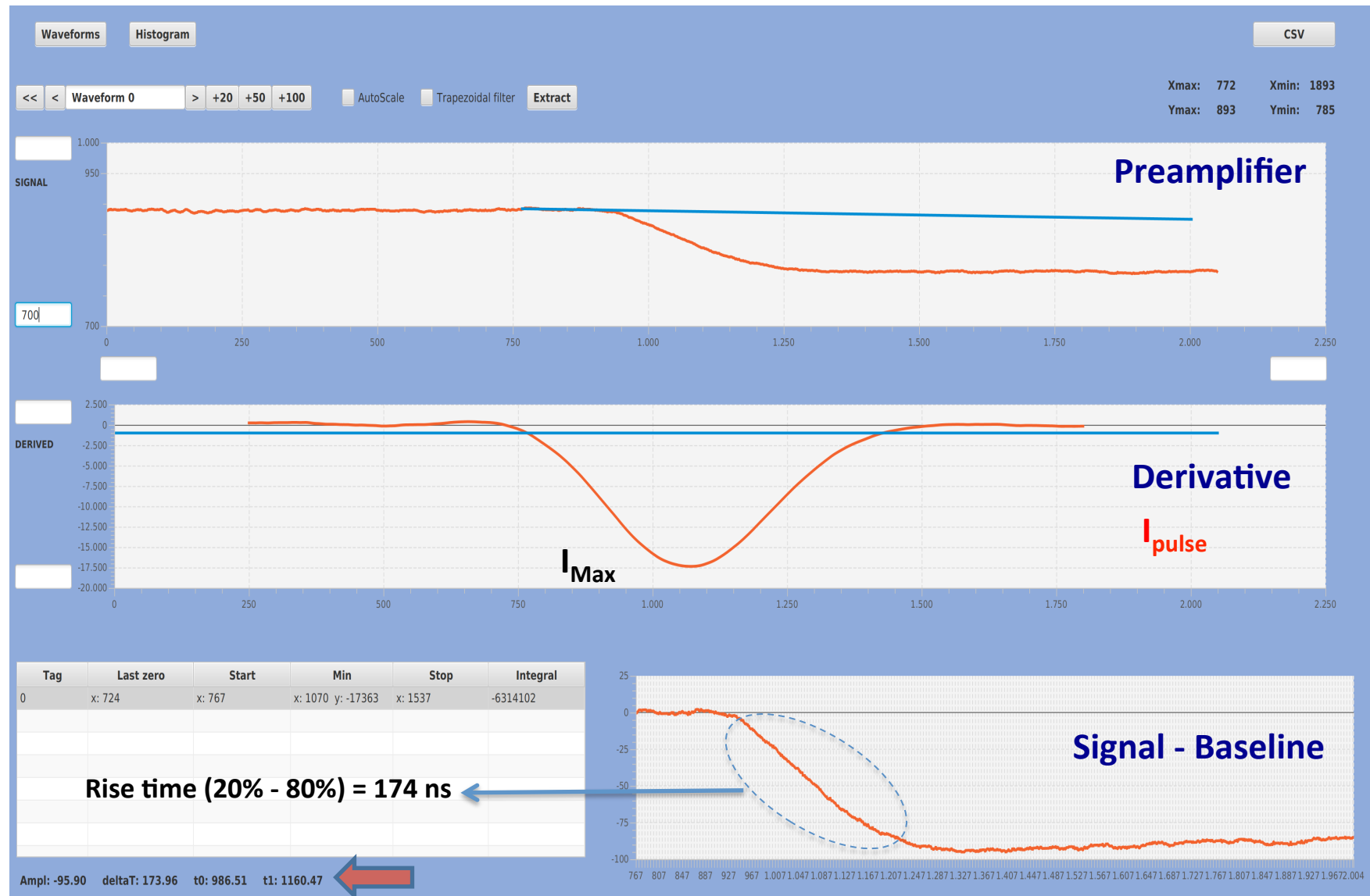
D. Mengoni et al, NIM A764 (2014) 241–246

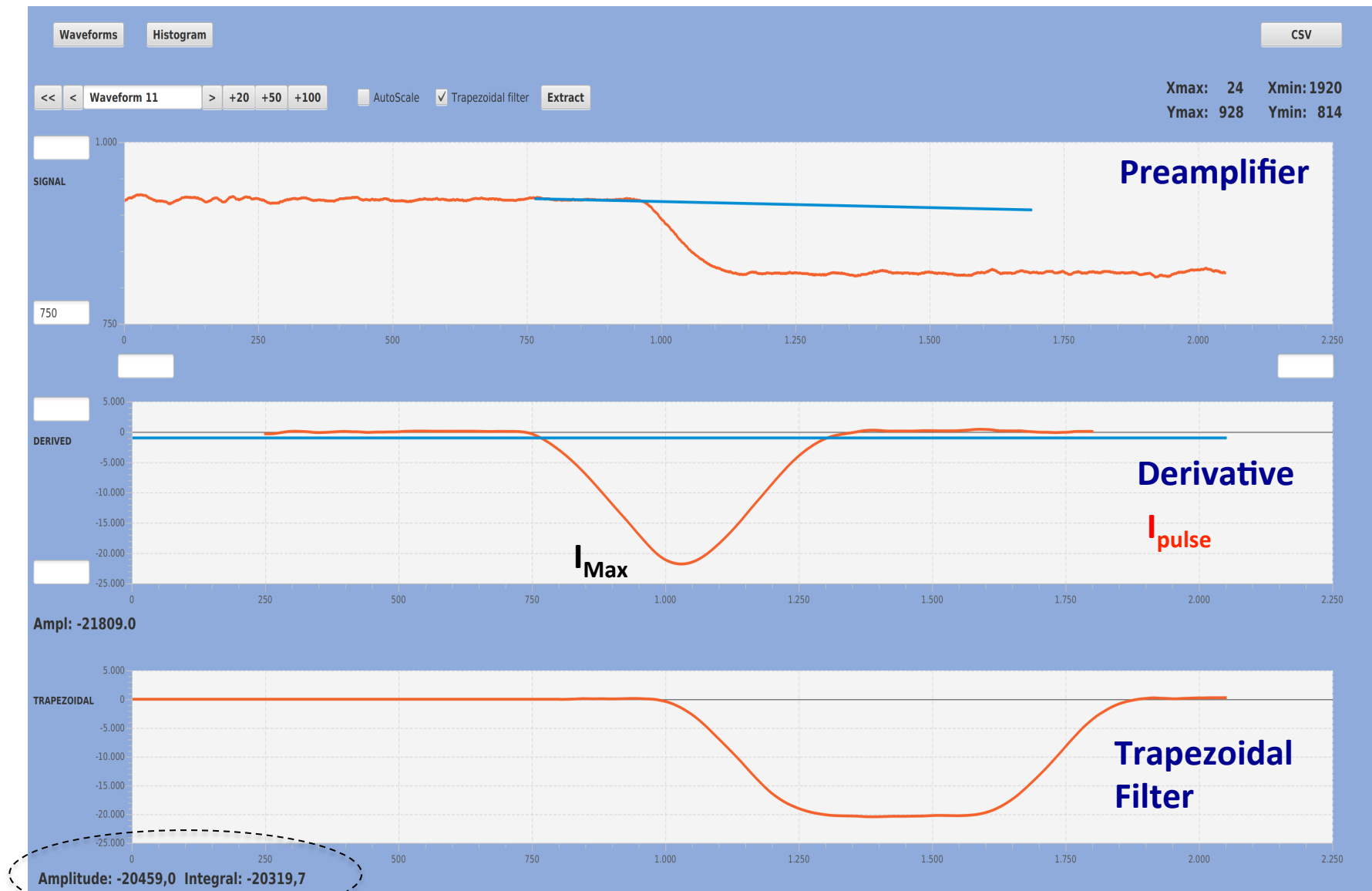


Current signal by:

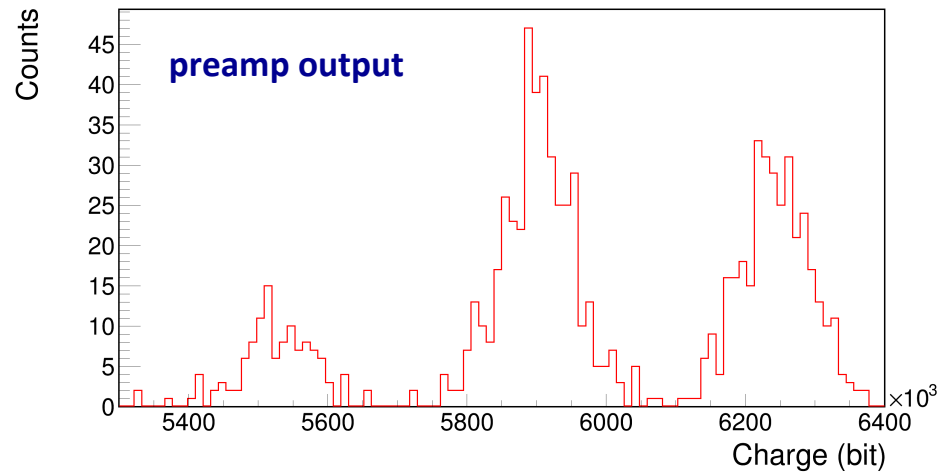
- *fast current amplifier*
- *derivative of the charge signal*



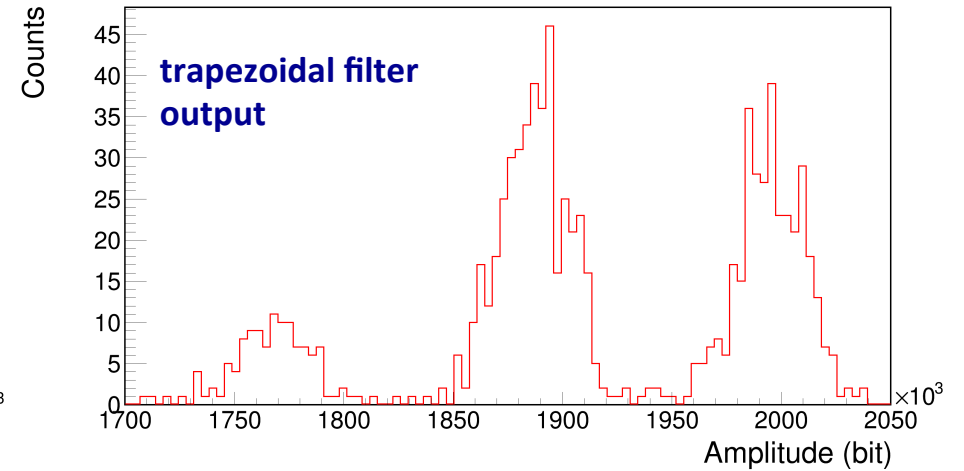




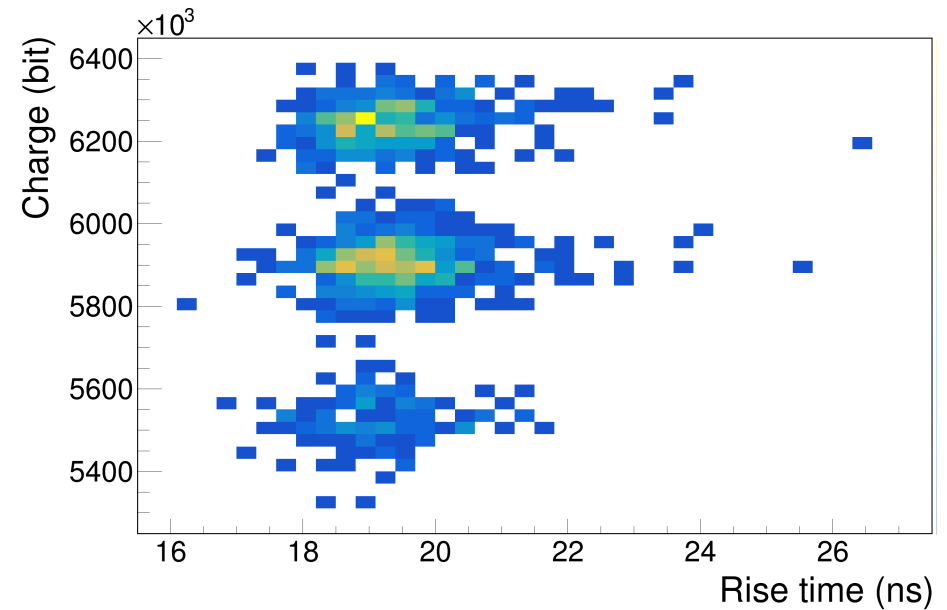
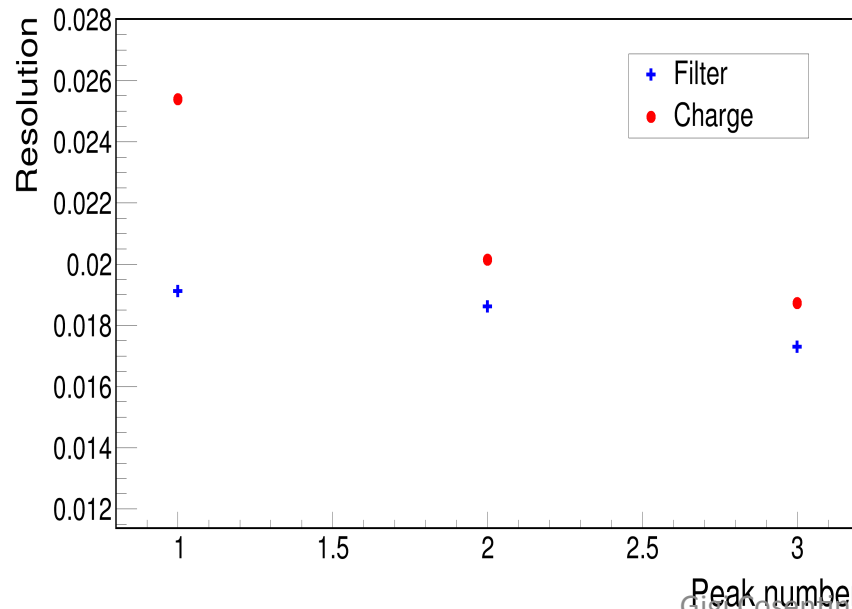
Signal total charge

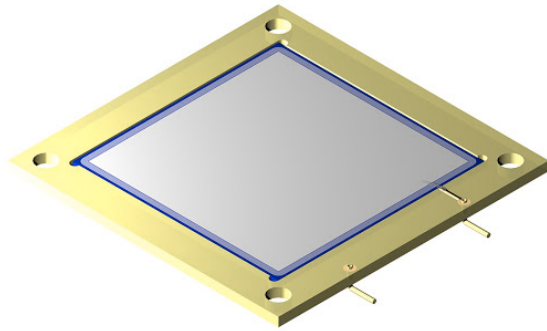


Signal amplitude with filter

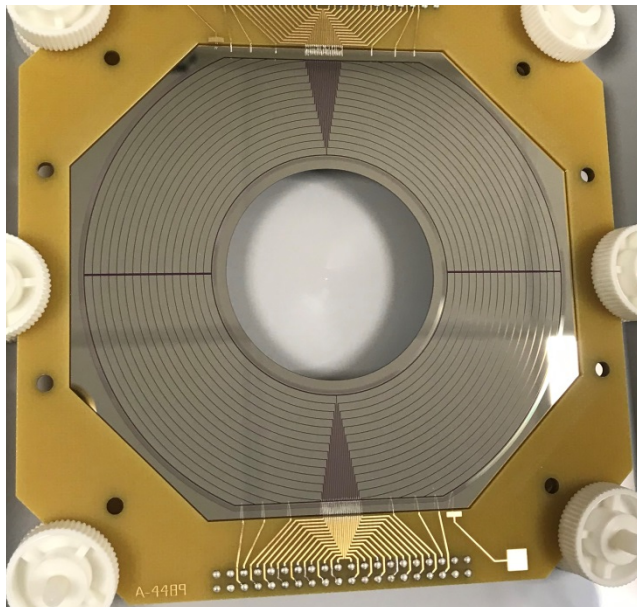


Resolution for each peak



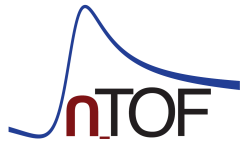


NTD Silicon detector - Single PAD



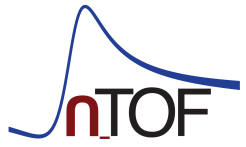
Micron Semiconductor

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- No of Rings (Junction): 16
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- No of Sectors (Ohmic): 16



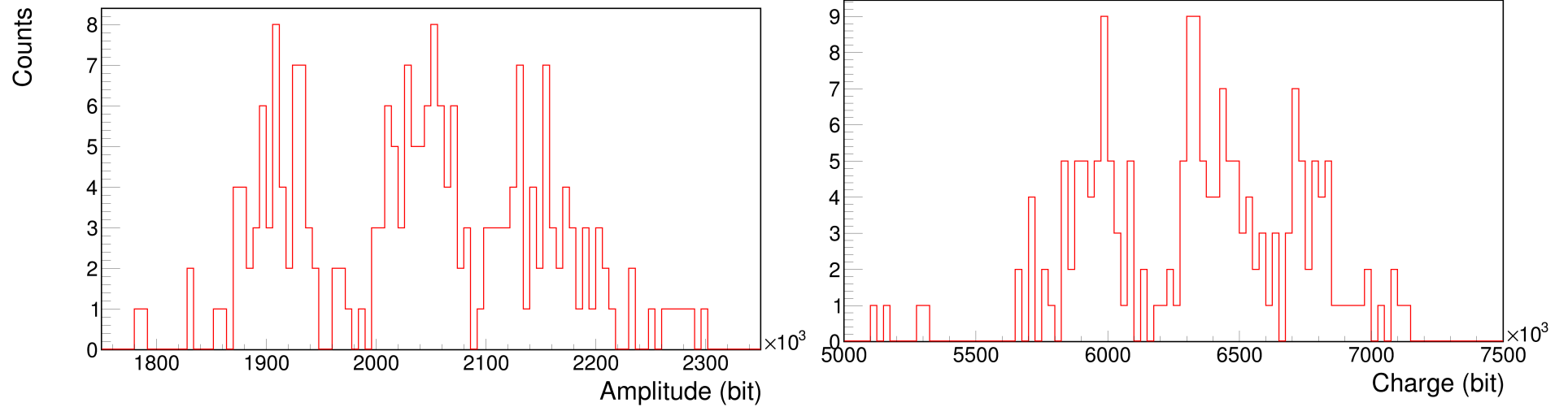
Fase 2

- **Messa a punto del software di analisi con ulteriori misure alpha – silicio NTD 3x3cm²**
- **Discriminazione ³H – alpha con sorgente di neutroni e ⁶LiF layer**
- **Realizzazione PCB per il rivelatore anulare**
- **Test con rivelatore anulare e sorgenti**

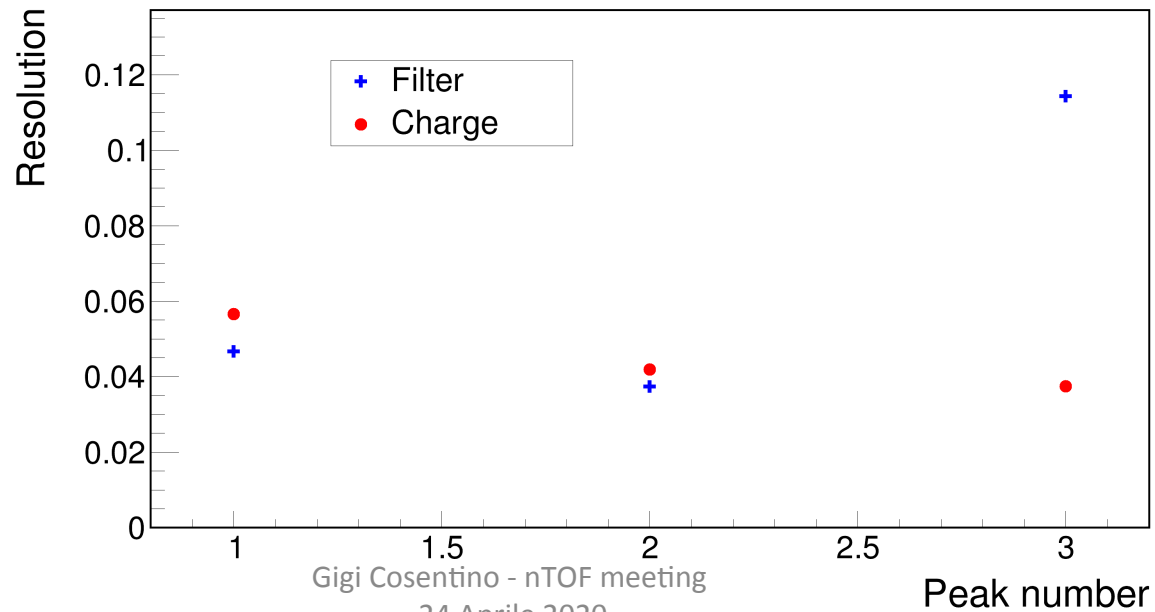


Signal amplitude with filter

Signal total charge

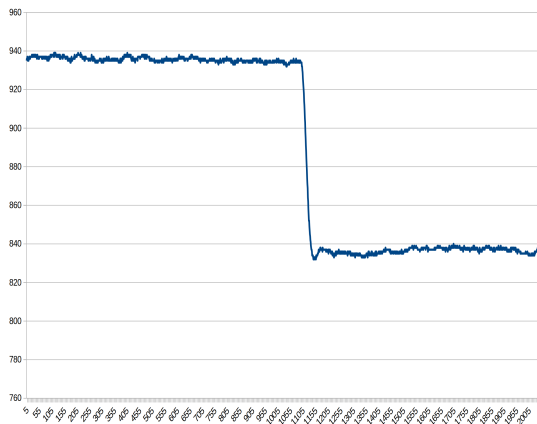


Resolution for each peak

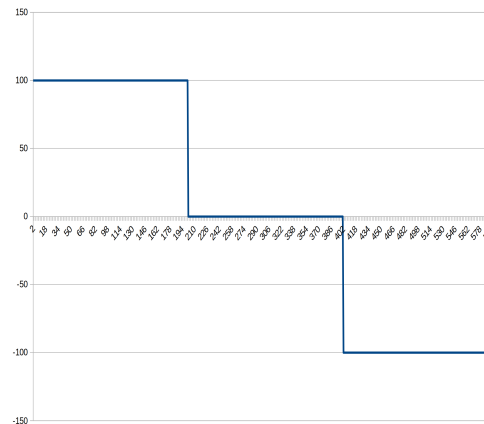


Trapezoidal filter - Convolution

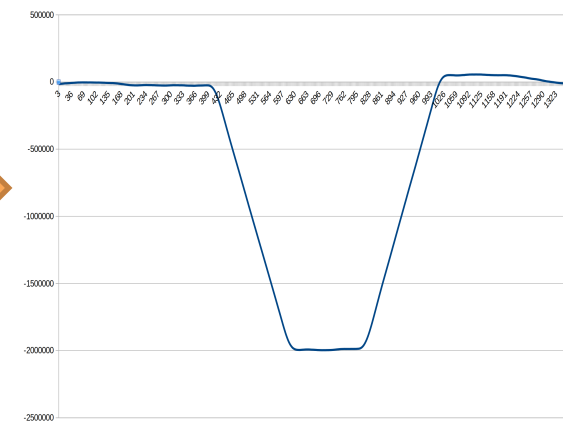
Original signal



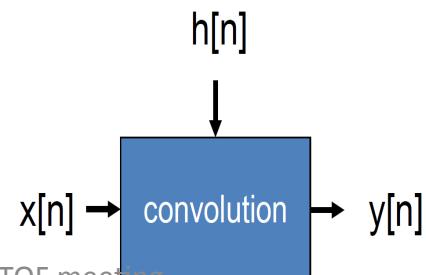
Bipolar filter

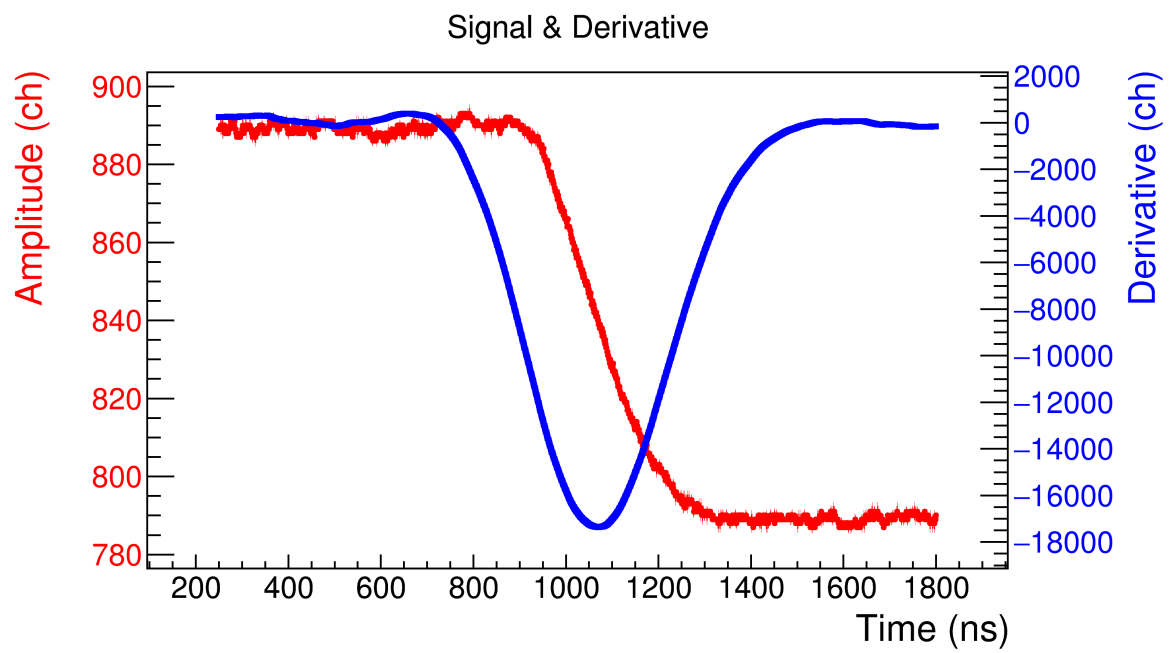


Trapezoidal output



$$y[n] = \sum_{k=0}^N h[k] \cdot x[n-k]$$





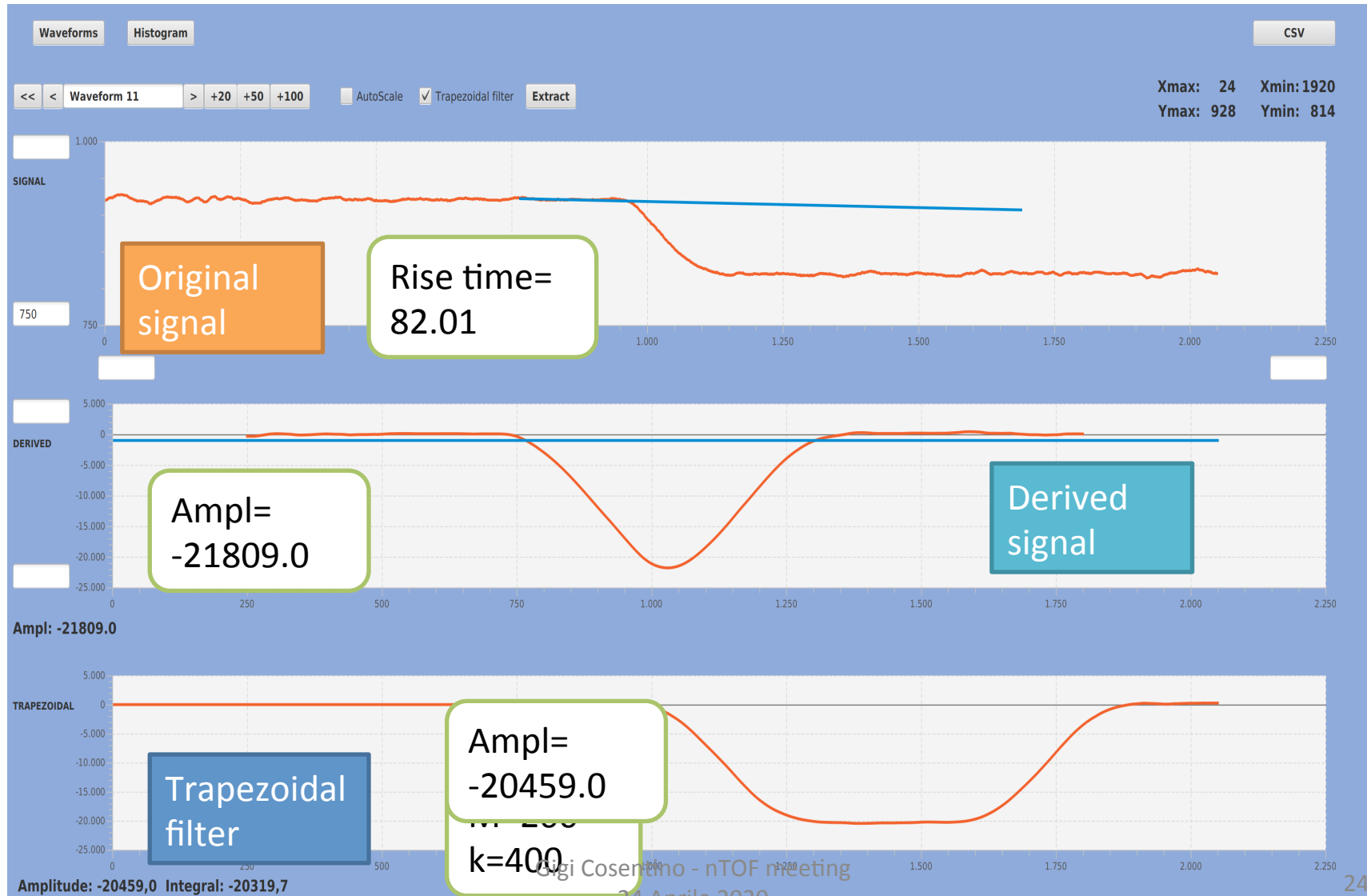
Signal without background calculation

$s(i) = v(i) - \text{PolynomialCurveFitter}(i)$

```
for(int i=startx; i<2*stopx-minderx; i++){
    ((XYChart.Series)linechart.getData().get(2)).getData().add(new XYChart.Data(i, bestFit[1]*i+bestFit[0]));
    backgmap.put(i, bestFit[1]*i+bestFit[0]);
}
```

```
for(int i=start; i<2*stop-xmin; i++){
    Double snw=0.0;
    if(i<((XYChart.Series)linechart.getData().get(0)).getData().size())
        snw=(Integer)((Data)((XYChart.Series)linechart.getData().get(0)).getData().get(i)).getYValue()-backgmap.get(i);
    ((XYChart.Series)signalsubchart.getData().get(0)).getData().add(new XYChart.Data(i, snw));
}
```

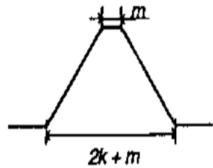
Trapezoidal Filter



Trapezoidal Filter

$$s(n)=s(n-1)+v(n)-v(n-k)-v(n-l)+v(n-l-k)$$

where $l=k+m$



```
for(int i=0; i<arr.length; i++){
    if(i<2*k+m){
        s.add(0.0);
        ((XYChart.Series)trapezchart.getData().get(0)).getData().add(new XYChart.Data(i, 0));
    }
    else{
        double val=s.get(i-1)+Integer.parseInt(arr[i])-Integer.parseInt(arr[i-k])
            -Integer.parseInt(arr[i-k-m])+Integer.parseInt(arr[i-m-2*k]);
        s.add(val);

        ((XYChart.Series)trapezchart.getData().get(0)).getData().add(new XYChart.Data(i, val));
    }
}
/*
```

